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BETA-PROTHROMBOPLASTIN DEFICIENCY CAUSING A HÆMORRHAGIC TENDENCY RESEMBLING HÆMOPHILIA.

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UNTIL a few years ago hæmophilia was the only congenital hæmorrhagic condition recognized as being caused by a derangement of the plasma thromboplastin complex, although an acquired hæmorrhagic tendency due to an inhibitor of the thromboplastin complex has also been recognized for some time. Recently it became apparent that the term "hæmophilia" covered several unrelated diseases. The first indication that more than one type of deficiency could produce a "hæmophilic" syndrome came from the occasional observation that blood specimens taken from two apparent hæmophiliacs, each of whom had a prolonged whole blood clotting time, when mixed "had a coagulant action nearly as effective as normal blood" (Pavlovsky, 1947). Further, it was noted that the anti-hæmophilic fraction isolated from normal human plasma was of temporary benefit in the treatment of some patients, but of no avail in others. Clinical reports and laboratory findings are available to indicate that more than one factor is involved in thromboplastin formation in blood, and that a deficiency of any of the factors may be the cause of hæmorrhages (see appended list). As a result of the examination of 36 male bleeders, who previously on clinical grounds and laboratory evidence were considered to be hæmophiliacs, it was found that six patients were suffering from a deficiency different from that in hæmophilia. Their clinical features and laboratory findings are presented.

Terminology.

The clinical symptoms of hæmorrhagic conditions resembling hæmophilia are identical. Therefore terminology based on symptoms is not possible. Other hæmorrhagic diseases due to a deficiency of a coagulation factor are named after the factor—for example, hypoprothrombinæmia *et cetera*. The group of hæmorrhagic disorders under discussion is connected with thromboplastin, and it appears logical to derive nomenclature from these facts. As the components required for thromboplastin formation have been separated from plasma, it is suggested that the factor which is deficient in hæmophilia be called α-prothromboplastin. Synonyms for this component are antihæmophilic globulin (Lewis *et alii*, 1946) and antihæmophilic factor, AHF (Brinkhous *et alii*, 1951). The second factor essential for the formation of plasma thromboplastin will be called

[1] Part of the expenses of this investigation were defrayed by a grant from the National Health and Medical Research Council, Commonwealth of Australia.

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β-prothromboplastin. Synonyms for the latter term are plasma thromboplastin component, PTC (Aggeler *et alii*, 1952) and Christmas factor (Biggs *et alii*, 1952). Hemophilia becomes then α-prothromboplastin deficiency, and PTC deficiency or Christmas disease becomes β-prothromboplastin deficiency.[1]

Clinical Features of Beta-Prothromboplastin Deficiency.

Apart from evidence of the hæmorrhagic diathesis, no congenital or other abnormality was found in the six cases to be described. In all instances the clinical severity of the disease was stated to vary from time to time. Apart from anæmia due to blood loss, no abnormality of the formed elements in the blood was found. The thrombocyte counts were always within normal limits. The skin bleeding time estimated by the Duke technique was found to be prolonged in some of these patients, but the significance of this finding is not yet obvious. This aspect of the investigation is being pursued, as a similar finding has been observed in the α-prothromboplastin deficiency state. Although it has been surmised by Quick and Hussey (1952) that a vascular factor may be involved, it has not been previously demonstrated that prolonged bleeding times can be found in this group of bleeders.

The family histories were in no way unusual. Two of the patients appear to be suffering from "sporadic" disease. Those with inherited disease showed the recessive sex-linked type of inheritance. Individual clinical features are given in brief.

CASE I.—A, aged twelve years, an only child, shortly after birth was discovered to be a bleeder as the result of clotting time tests. From the age of six months he has suffered from recurring hæmorrhages, including hæmatomata, hæmarthroses, epistaxes, dental bleeding, abdominal pains and melæna. He has received many blood transfusions, usually with rapid cessation of bleeding. Three maternal uncles were considered to be "hæmophiliacs".

CASE II.—B, aged thirty-eight years, is an uncle of A (Case I), and the only survivor of three male bleeders. His first serious hæmorrhage occurred at the age of two years from a lacerated finger. Although he improved after the age of fourteen years, he has had serious intraabdominal bleeding (retroperitoneal and renal) in recent years. No earlier family history of bleeding is known.

CASE III.—C., aged fourteen months, the younger of two boys, bled only slightly after circumcision at the age of eight days. From the age of six months onwards he has had frequent severe bruising, and hæmatomata, and bled from a lacerated gum for three days. His brother has no clotting defect. There is no family history of a bleeding tendency.

CASE IV.—D, aged eleven years, an only child, has bruised excessively since eleven months of age, and has suffered from hæmarthroses, prolonged skin bleeding, and bleeding following dental extraction. He has had two retroperitoneal hæmorrhages, for which admission to hospital was necessary. On the first occasion he was subjected to laparotomy. No family history of a bleeding tendency could be obtained.

CASES V AND VI.—E, aged five years, and F, aged four years, are the only children of a woman whose father was a bleeder, and who died at the age of forty-seven years from an intraabdominal hæmorrhage. Both boys showed bruising at the age of nine months, and have suffered from hæmarthroses and from prolonged bleeding from lacerations. F has had a more severe clinical course in all respects than his brother. He has also had severe intraabdominal hæmorrhage, and he has Volkmann's ischæmic contracture of the left arm as the sequel to a hæmorrhage into his arm.

From the short description of these six patients it is apparent that the course of the disease, family history and heredity could be mistaken for α-prothromboplastin deficiency (hæmophilia).

Laboratory Evidence of Beta-Prothromboplastin Deficiency.

In order to prove that a bleeding tendency is caused by a deficiency in the thromboplastin complex, it is, of course, essential to exclude a deficiency of other clotting factors—namely, that of prothrombin, prothrombin accelerators, fibrinogen and thrombocytes. The absence of clotting inhibitors has likewise to be established. Tests for these components were carried out, and it was found that the six patients under discussion showed no abnormality in that respect. Suggestive evidence that at least two components contribute to plasma-thromboplastin formation was obtained in four instances. Oxalated plasma from the patients was mixed in equal proportions, and to 0·2 millilitre of the mixture was added 0·2 millilitre of a 0·025 M calcium chloride solution at 37° C. The results of such tests are given in Table I.

TABLE I.
Clotting Times (Minutes) of Recalcified Plasma of α-Prothromboplastin and β-Prothromboplastin Deficiencies.

Subject.	Glass.	Silicone.
X (α-deficient)[1]	17	108
A (β-deficient)	50	105
X+A	5	20
Y (α-deficient)[1]	12	78
B (β-deficient)	105	230
Y+B	6	34

[1] These two cases are not further discussed in this paper. It was established that the patients were true hæmophiliacs. Their blood was deficient in α-prothromboplastin (anti-hæmophilic factor), but had a normal content of the β factor.

From the results given in Table I it is apparent that, whereas the plasma of each patient showed a greatly delayed clotting time, the mixtures of plasma gave a normal result. This is particularly clear in the tests carried out in silicone-coated tubes. It appears that patients X and Y are deficient in one factor, whilst patients A and B are deficient in another, and each corrected the deficiency of the other. From these results it cannot be stated which of the patients suffered from the particular deficiency.

From the work of Aggeler *et alii* (1952), it is known that the addition of barium sulphate to oxalated plasma does not affect the α-prothromboplastin content, although it removes several other clotting factors including β-prothromboplastin. Plasma treated with barium sulphate is therefore a good source of α-prothromboplastin. On the other hand, we find that during storage of normal human oxalated plasma at room temperature for ten days, α-prothromboplastin activity disappears, while the β-component is not diminished. With these two reagents, barium sulphate treated plasma and stored plasma, it is possible to detect and to distinguish between an α-prothromboplastin or β-prothromboplastin deficiency if deficiencies of prothrombin accelerators can be excluded.

Experimental Procedures.

Venous blood was obtained by venepuncture with a 20 gauge needle with syringe attached. After aspiration of a few cubic centimetres of blood a fresh syringe was used, the tip of which was coated with "Vaseline" to ensure an airtight joint.

1. By the Lee White (1913) method, the whole blood clotting time was estimated with 1·5 millilitres of venous blood in "Pyrex" glass tubes at 37° C., and in tubes coated with silicone according to the method of Jaques *et alii* (1946).

2. Recalcification of plasma and plasma mixtures was carried out with 0·2 millilitre of oxalated or citrated plasma, to which 0·2 millilitre of 0·025 M calcium chloride solution was added at 37° C. Clear plasma was obtained after centrifugation.

3. "Ba-plasma" was obtained by the addition of one volume of a freshly prepared barium sulphate suspension to 10 volumes of oxalated normal plasma.

4. Stored plasma was obtained by mixing one volume of 0·1 M sodium oxalate containing $0{\cdot}4 \times 10^{-3}$ parts of merthiolate and nine volumes of venous blood. Plasma was obtained after centrifugation in the cold, and approxi-

[1] For other suggestions regarding nomenclature see symposium: "What is Hemophilia?", *Blood* (1954), 9: 244.

TABLE II.

Laboratory Findings in β-Prothromboplastin Deficiency.

Case Number.	1. Blood Clotting Time. (Minutes.)	2. Plasma Recalcification Time. (Minutes.)	3. Plasma Recalcification *plus* 50% "Ba-Plasma". (Minutes.)	4. Plasma Recalcification *plus* 10% Stored Plasma. (Minutes.)	5. Plasma Prothrombin. (*Per Centum.*)	6. Serum Prothrombin.		7. Prothromboplastins.	
						(*a*) One Stage. (*Per Centum.*)	(*b*) Concentration. (*Per Centum.*)	(*a*) α (*Per Centum.*)	(*b*) β (*Per Centum.*)
I	120 to 180	17 to 50	—	—	100	85	—	100	0
II	120	40 to 105	84	8	100	60 to 120	35	100	0
III	150 to 180	27 to 55	19	7½	>50	30 to 90	10 to 30	100	0
IV	260	20 to 40	16	5	100	70	20	100	15
V	240 to 300	25 to 50	25 to 60	7½	100	80	10	100	0
VI	120 to 240	50	25	7½	100	200	20	100	0
α - Prothromboplastin deficiency	15 to 400	6 to 50	5 to 7	6 to 50	60 to 140	0 to 100	0 to 100	0 to 25	100
Normal	5 to 19 (glass)	2½ to 6	3 to 5	3 to 5	60 to 140	0 to 5	0 to 2	100	100

mately 20 millilitres were stored under sterile conditions in test tubes plugged with cotton-wool, and kept at 20° C. in the dark.

5. Serum was obtained from clotted blood, which was kept in a water bath at 20° C. for twenty-four hours.

6. Prothrombin determinations were carried out with two different techniques. (i) The one-stage technique of Quick (1951) was used, except that the source of thromboplastin was a suspension of 6% human brain, and calcium chloride was used in 0·01 M concentration. (ii) The prothrombin concentration was determined in plasma and serum according to the technique of Fantl (1954*a*).

7. The determination of α-prothromboplastin and β-prothromboplastin concentration in blood and plasma was carried out indirectly by the rate of thrombin formation. The details of the technique are given elsewhere by Fantl (1945*b*).

The results of investigations on blood and plasma specimens from the six patients are given in Table II; and for comparison results in patients with α-prothromboplastin deficiencies and in normal donors are shown in the last two lines.

The results given in Table II indicate that all six patients had a greatly delayed whole blood clotting time (Column 1) and a prolonged plasma recalcification time (Column 2). The addition of α-prothromboplastin in the form of "Ba-plasma" to the patients' plasma had little or no effect in correcting the plasma clotting time (Column 3), but the addition of β-prothromboplastin in the form of stored plasma brought the clotting time within the normal range (Column 4). Prothrombin determinations gave normal values (Column 5). Therefore it is evident that the six patients suffer from a β-prothromboplastin deficiency (PTC deficiency, Christmas disease). Further, it will be noted that the sera twenty-four hours after clotting still contained prothrombin. Figures obtained by the one-stage technique are considerably higher (Column 6 (*a*)) than those by a prothrombin assay (Column 6 (*b*)). The reason for the discrepancy is that prothrombin accelerating factors (SPCA, Factor VII) are present in adequate amounts in the sera of the six patients, and influence the results of the one-stage technique but have no effect on the absolute amount of prothrombin. A quantitative estimation of the α-prothromboplastin and β-prothromboplastin components based on the rate of thrombin formation in diluted blood was carried out, and the results of such tests are tabulated in Columns 7*a* and and 7*b*. Results indicate that the six patients have a normal α-prothromboplastin concentration, but suffer from a severe β-prothromboplastin deficiency.

Discussion.

From the presented experimental evidence it is clear that the six patients are deficient in a plasma factor essential for normal clotting, and that this factor is required for the formation of plasma thromboplastin complex. As far as can be ascertained, "positive" family histories are available in the case of four of the patients studied. There was no evidence of a family history of bleeding in two cases (Cases III and IV). It would therefore appear that we are dealing with a congenital defect which can occur spontaneously, just as has been observed to occur in α-prothromboplastin deficiency (hæmophilia). Some of the patients have been observed for several years, and no evidence of a change in the clotting behaviour of their blood *in vitro* was noticed, despite the impression which the patients and relatives frequently have of a cyclic variation of the bleeding tendency. No pathological changes other than the clotting defect seem to be associated with the β-prothromboplastin deficiency in the observed patients. The presented cases are on clinical and laboratory evidence of a severe type. So far no mild bleeders have been observed. This is in contrast to our cases of α-prothromboplastin deficiency (hæmophilia), in which the deficiency ranges from a minor to a complete absence of the α-factor. With regard to treatment, limited experience indicates that the deficiency can be corrected by intravenous administration of whole blood or citrated plasma, which need not be fresh because of the stability of the β-factor. In the test tube, whole blood and oxalated or citrated plasma were found equally effective in correcting the clotting defect.

No relation of β-prothromboplastin to other clotting factors—for example, SPCA, co-thromboplastin, Factor VII or proconvertin—has been noted in our studies.

The occurrence of β-prothromboplastin deficiency in a preliminary survey among Victorian patients indicates that the ratio to α-deficiency (hæmophilia) is 1:5.

β-prothromboplastin deficiency (PTC deficiency, Christmas disease) has been observed by previous workers (Koller *et alii*, 1950; Aggeler *et alii*, 1952; Schulman and Smith, 1952; Biggs *et alii*, 1952; Van Creveld and Paulssen, 1953; Lewis and Ferguson, 1953; Poole, 1953; Rosenthal, Dreskin and Rosenthal, 1953).

Theory of Thromboplastin Formation.

With regard to the theory of thromboplastin formation in shed blood, evidence has been given elsewhere that precursors of the thromboplastin complex are present in blood (Fantl and Hayes, 1953) as well as in lymph (Fantl and Nelson, 1953). The precursors become activated on torn blood vessels and glass. The activation of the prothromboplastins to the thromboplastins occurs in the absence of thrombocytes, and in the presence of anticoagulants. It has been assumed that a kinase-like activation of α-prothromboplastin and β-prothromboplastin occurs. This will produce α-thromboplastin and β-thromboplastin respectively. However, the amount of thromboplastin so formed is only sufficient to initiate clotting, but cannot convert all the prothrombin into thrombin. However, in the presence of an adequate number of thrombo-

cytes and calcium ions, a maximum formation of thromboplastin occurs, and complete conversion of prothrombin into thrombin takes place. Finally it should be mentioned that thromboplastin activators (SPCA, co-thromboplastin, Factor VII, proconvertin) and thromboplastin inhibitors influence the rate of thrombin formation.

According to these ideas the scheme of thromboplastin formation in shed blood can be presented as follows:

Kinase + α-prothromboplastin → α-thromboplastin (antihæmophilic factor)

Kinase + β-prothromboplastin → β-thromboplastin (PTC, Christmas factor)

α-thromboplastin } + thrombocytes + calcium ions
β-thromboplastin }

→ thromboplastin complex

Summary.

1. A congenital hæmorrhagic tendency in six male patients which resembles hæmophilia has been investigated.

2. It was found to be due to a deficiency of a factor essential for thromboplastin formation in shed blood.

3. This factor is called β-prothromoplastin, in contrast to α-prothromboplastin, which is lacking in hæmophilia.

4. Techniques for the detection of thromboplastin precursors and data showing the degree of the blood deficiencies in the six patients are presented.

5. Beta-prothromboplastin deficiency, which is synonymous with PTC deficiency and Christmas disease, is compared clinically and by means of laboratory test with α-prothromboplastin deficiency (hæmophilia).

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THE MANAGEMENT OF CHRONIC HYPOPARATHYROID TETANY.

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THIS paper is prompted by the admission to the Clinical Research Unit of the Royal Prince Alfred Hospital of several patients with serious and disabling complications of hypoparathyroid tetany. It is possible that these serious complications are commoner than is usually considered, and they certainly do provide important reasons for adequate treatment of the patient with chronic tetany.

It is well known that an increased irritability of the peripheral nervous system leads to paræsthesiæ, painful muscular twitchings and cramps, carpopedal spasms, laryngeal spasm and obstruction which are commonest in children, and the classical signs of Trousseau and Chvostek, the latter being unreliable in our hands. Irregular transverse ridging of the finger nails is common and is said to be specific, but scaling of the hands and feet with friable irregular nails, perhaps associated with Monilia infection, is common only in idiopathic hypoparathyroidism and is resistant to treatment. Calcification may occur in the basal ganglia in patients with long-standing tetany, but it appears to be without consequence.

Bilateral lamellar cataract is one of the most serious complications, for it is irreversible and requires operative treatment. Minor changes develop rapidly in the lenses of some patients, and may be recognized only by slit-lamp examination.

Symptoms referable to the central nervous system are common, are often misinterpreted and may be serious. Electroencephalographic abnormalities have been found in all our patients with central nervous system symptoms. Epileptic fits, major and minor, are far from rare, and their association with papilloedema, raised intracranial tension and encephalographic changes has been studied and reviewed by Kerr Grant from this unit. Mental changes are common and may be of rapid onset after parathyroidectomy; mild to severe mental confusion with peculiar behaviour at night has been observed more than once and may lead to a diagnosis of hysteria. Patients with psychic changes from tetany have been admitted to mental institutions before the diagnosis of tetany has been made.

It is well known that the parathyroid hormone plays a major role in the regulation of the serum calcium concentration; it can mobilize calcium from bone in response to the appropriate stimulus, and the same or another hormone appears to increase the renal excretion of inorganic phosphate so that parathyroid deficiency leads to hypocalcæmia and hyperphosphatæmia. The product of the serum calcium and the serum phosphorus levels is relatively constant in the presence of adequate absorption of calcium and phosphorus and of adequate renal function.

[1] This work was partly supported by the National Health and Medical Research Council.

As this product is normal in hypoparathyroidism, rickets does not develop in the growing subject, indeed there tends to be hyperossification.

Neuromuscular irritability is affected by several cations, and the following relationship crudely expresses their interaction; irritability varies with $\frac{(Na^+) + (K^+)}{(Ca^{++}) + (Mg^{++}) + (H^+)}$, and so hypocalcæmia and alkalosis may both induce tetany and a raised serum potassium level will tend to accentuate their effects.

In the serum and extracellular fluid the concentration of ionized calcium is of much greater importance than the total calcium content, so that it is desirable to estimate its concentration. This is most simply done by determining the total serum protein concentration at the same time as the total serum calcium content and estimating the ionized calcium from the Hastings-McLean nomogram. Latent tetany is usually present when the total serum calcium content is seven to eight milligrammes per 100 millilitres if the serum protein concentration is normal, and patent tetany occurs at serum calcium levels of seven milligrammes per 100 millilitres or less, depending, in part, on the initiating episode.

The effects of chronic tetany appear to be due to continued hypocalcæmia, but secondary changes take place and are not rapidly reversible. Peripheral neuromuscular irritability is rapidly reversed by the intravenous injection of calcium salts, but the mental and encephalographic changes may not disappear for some days in spite of a normal serum calcium level. Irreversible calcification in the basal ganglia and cataracts are considered to be due to the deposition of calcium in damaged areas rather than to primary calcification.

Management.

The aims of treatment are to prevent tetany and its complications, to maintain the serum calcium and serum inorganic phosphorus levels in the normal range, and to deal with any complications that are already present.

As the parathyroid hormone preparations at present available are without value except to produce an acute transient effect, other methods of treatment must be used. The serum calcium level may be raised by increasing the absorption of calcium from the intestine by administering vitamin *D* and calcium salts, and the serum phosphorus level may be lowered by raising the serum calcium level, by decreasing the intestinal absorption of phosphorus by prescribing a diet of low phosphorus content, and by making the dietary phosphorus as insoluble as possible. Hypercalcæmia is prevented by careful control of treatment by frequent determinations of the serum calcium concentration.

Our routine treatment of a patient with chronic hypoparathyroid tetany is as follows. Calcium lactate, 10 to 20 grammes a day (three to six teaspoonfuls), is prescribed to ensure a high calcium intake and to compensate for a calcium-poor diet. It is important to remember that the calcium content of the lactic acid salt is 13%, but of the gluconic acid salt only 9%, so that appropriate adjustments in dosage must be made when a change is made from one salt to the other. Calcium chloride contains 36% calcium; but it tends to induce acidosis. The calcium salt is taken in the manner recommended by the Mayo Clinic group (Haines, 1940); the patient measures out the daily dose of the powder each morning or evening, dissolves it in some boiling water, flavours it with lemon juice, makes up the volume to some 300 millilitres (half a pint), and places the solution in a jug in the refrigerator. The solution is drunk during the day, and this method ensures that the calcium is readily available for absorption. The patient is carefully instructed to take a diet of low phosphorus content, which is, in essence, a diet containing minimal amounts of milk and milk foods, and which also has a low calcium content. Aluminium hydroxide gel, as "Amphojel" (10 millilitres daily—three teaspoonfuls), is usually prescribed further to limit the absorption of phosphorus.

Dihydrotachysterol ("A.T.10") is theoretically the best vitamin *D*-like substance to administer, since it has a considerable effect in increasing intestinal calcium absorption and renal phosphorus excretion, its effects are rapid, and most patients can be stabilized on it quickly; but it costs more than vitamin *D*. It is our practice to prescribe "A.T.10", 1·25 milligrammes (two capsules) daily, for the patient with moderate to severe symptoms, and to increase the dose if necessary after a week or less if tetany is not controlled. When serum calcium concentrations have been maintained at a satisfactory level for some weeks or months a vitamin *D* preparation is substituted. We substitute vitamin *D* ("Ol Vita D") in two stages to avoid hypocalcæmia and hypercalcæmia. Half the daily dose of "A.T.10" is stopped and "Ol Vita D" is substituted for it, 50,000 units for each 0·625 milligramme (one capsule) of "A.T.10". After two weeks substitution is completed.

When vitamin *D* is being used without a trial of "A.T.10", we usually begin with a dose of 100,000 units a day, as most patients need between 100,000 and 200,000 units a day, and we increase the dose 50,000 units from time to time until satisfactory serum calcium levels are obtained. The dose of vitamin *D* is changed only every few weeks or months, since the serum calcium levels may not become stable on a given dose for several weeks.

Serum calcium concentrations are estimated at weekly intervals until they have been stabilized at between nine and 11 milligrammes per 100 millilitres for some weeks, and then longer intervals are permitted; but we observe a patient for many months before allowing more than a month to elapse between visits. Serum protein and serum phosphorus levels are determined on most blood specimens, though they are not essential in most patients after the initial controlling period.

We do not consider that the Sulkowitch test for calcium in the urine should replace the determination of serum calcium content, even though it is simple to perform, and Albright (1939) suggested that the tetanic patient could treat herself like a diabetic and test her own urine. We have found the test unreliable on more than one occasion, for a negative result has been obtained when the serum calcium content was normal, and a positive result with low serum calcium level (Kerr Grant, 1953). However, a strongly positive result in the absence of a highly concentrated urine does suggest hypercalcæmia and is an indication for determining the serum calcium concentration and decreasing the dose of vitamin *D*.

The principles of treatment are illustrated by Figure I, which is prepared from data obtained from a young woman with idiopathic hypoparathyroidism and tetany complicated by bilateral cataracts, intracerebral calcification, and epidermal changes. Excellent control of her tetany has been obtained by prescribing a diet of low phosphorus and calcium content, calcium lactate, "A.T.10" and then vitamin *D*, and "Amphojel". She has been followed for three and a half years.

Miss X (CRW 81) is a clerk, aged thirty years, who had no illnesses prior to the age of ten years. Her two siblings, eleven and twelve years her senior, have had no significant illnesses, and there is no history of hereditary or familial illness. At the age of ten years, about twelve months before her menarche, her toenails became scaly, the skin of her toes lichenified and, at the age of fifteen years, her hands became affected in the same manner. *Acne vulgaris* appeared when she was thirteen years of age, became severe after X-ray treatment, and subsided some five to six years later, leaving moderate scarring. She had difficulty in seeing her music when she was fifteen to sixteen years of age, and a diagnosis of bilateral cataract was made. Both eyes were operated on when she was aged twenty-three years, and she had her first attacks of frank tetany which were precipitated by nervous tension. She had injections of "Parathormone" for the next two years, but they were stopped as she obtained no benefit from them. After the onset of symptoms she had considerable dental caries and had all her teeth extracted. Her hair became lack-lustre and coarse in texture. Her menstrual cycle has been regular and she has no urinary symptoms.

In July, 1950, at the age of twenty-eight years, she was referred to the Clinical Research Unit. She had latent

tetany, gross scaling of her hands especially involving the palmar surfaces of the fingers, thick friable irregularly furrowed finger and toe nails, and bilateral cheilosis. Cataracts had been successfully dealt with and she was able to wear contact lenses. She had no papilloedema or optic atrophy, or any history of fits. X-ray examinations of her skull revealed considerable calcification in the region of the basal ganglia. She was of normal build, and her facies and hands in no way suggested "pseudo-hypoparathyroidism". Encephalographic tracings showed some irregularity, but none of the characteristic changes, and the irregularities disappeared with adequate treatment.

Laboratory tests indicated that the serum calcium concentrations were 4·7 to 5·7 milligrammes per 100 millilitres, the total serum protein concentrations 7·8 to 8·2 grammes per 100 millilitres, the serum inorganic phosphorus concentrations 6·8 to 7·3 milligrammes per 100 millilitres, and the blood urea nitrogen content 11 milligrammes per 100 millilitres. The Sulkowitch test on her urine gave a negative result. Investigation of renal function and pancreatic function revealed no abnormality. The injection of "Parathormone" was followed by a phosphate diuresis, which confirmed the clinical impression that she was not suffering from "pseudo-hypoparathyroidism". She was given a diet of low phosphorus and calcium content, calcium lactate 12 grammes daily, "A.T.10" 2·5 milligrammes daily, and "Amphojel". The excellent and maintained biochemical response is illustrated by Figure I, and her clinical improvement was as striking. On various occasions changes in the dosage of "A.T.10" were made for investigative purposes, and it was found that the serum calcium level rapidly fell and tetany developed when "A.T.10" with added calcium was withheld; but when treatment was recommenced her serum calcium level rapidly returned to or above normal. After two years of treatment vitamin *D*, 100,000 units daily, was substituted for "A.T.10" without significant disturbance in her serum calcium or serum phosphorus levels.

Dr. Miles Havyatt cultivated *Candida parakruzii* from her finger nails, but many forms of treatment have failed to produce significant benefit with the exception of copper ammonium hydroxide "soaks"; however, these so discoloured her hands that they proved a serious handicap. Her clinical course has been excellent, since she has had no tetany, has felt better than at any time in the previous seventeen years and has taken up singing again. She has had her cataracts needled once in the past two and a half years.

This history and chart (Figure I) illustrate the smooth control which can be obtained by the administration of "A.T.10", the ease of changing to vitamin *D* and the equally steady control with it. The rapid and evanescent action of "A.T.10" is clearly shown in this chart, since the serum calcium levels fell and rose rapidly when treatment was stopped and restarted respectively. The resistance of the skin and ungual lesions is characteristic of idiopathic hypoparathyroidism, though the serum calcium levels may be maintained within normal limits for years.

The administration of "A.T.10" does not always produce such good results, since three recent patients have been "refractory" to it, though this appeared to be due to relative inactivity of the preparation administered. One of these patients, who had post-operative hypoparathyroidism, was receiving 3·125 milligrammes of "A.T.10" daily in capsules, and her serum calcium concentration was maintained between eight and nine milligrammes per 100 millilitres. Within fourteen days of changing to "A.T.10" in liquid form, measured with a graduated pipette, but without change in dosage, her serum calcium level rose to over 12 milligrammes per 100 millilitres. Another patient had a partial response to 5·625 milligrammes of "A.T.10" daily, but had a good response when 200,000 units of vitamin *D* were substituted. Resistance to "A.T.10" has been described by various authors and may, at times, be unrelated to the activity of the drug; indeed a gradually increasing resistance is mentioned by Talbot *et alii* (1952). It is well to remember this unreliability of "A.T.10" and its relative cost when prescribing maintenance treatment for a patient with chronic tetany.

Figure I shows that many serum calcium and serum phosphorus determinations were made on this patient, perhaps more than were necessary; but the dangers of hypercalcæmia cannot be over-emphasized. Sudden death has been described as following the elevation of the serum calcium level to 16 milligrammes per 100 millilitres and more, and chronic hypercalcæmia can have disastrous effects on the kidneys. The Sulkowitch test on the urine may provide a warning, since a strongly positive result in the absence of highly concentrated urine indicates excessive calciuria and hypercalcæmia. Patients may take calcium and vitamin *D* for years without incident; but some develop hypercalcæmia rapidly, as is illustrated in the following case history. Figure II is prepared from the data on a middle-aged woman who has post-operative hypoparathyroidism, and whose condition appeared to be well controlled with vitamin *D*, diet and added calcium. A slight increase in serum calcium levels was not regarded seriously, and she developed acute hypercalcæmia,

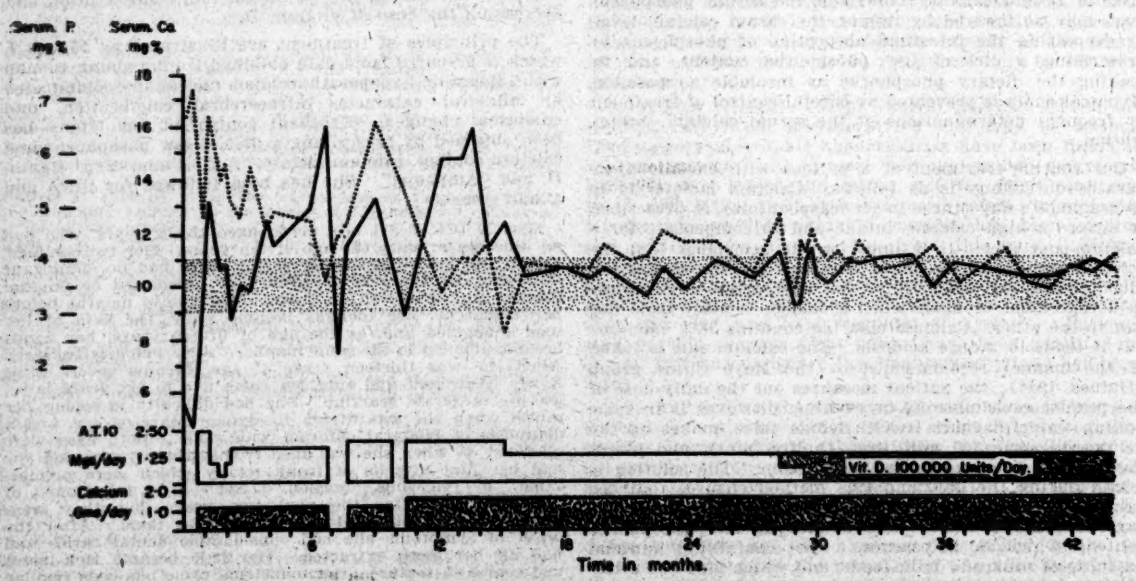

FIGURE I.

Serum calcium and serum inorganic phosphorus concentrations of a patient with idiopathic hypoparathyroidism during treatment with calcium, "A.T.10" and vitamin *D*.

Miss Y (P12051), a nursing sister, aged fifty-four years, was first examined in the Clinical Research Unit in December, 1951. She developed symptoms of hyperthyroidism in 1937 and underwent thyroidectomy, and a second thyroidectomy was performed in September, 1950, for hyperthyroidism. Carpopedal spasms occurred on the first post-operative day, and her voice was hoarse and weak. She was given a diet of high calcium content; but one week after operation a casual determination of her serum calcium concentration revealed it to be 9·0 milligrammes per 100 millilitres, and she continued to have tetany and a weak voice after her discharge from hospital.

On the patient's admission to the Clinical Research Unit, neither Trousseau's sign nor Chvostek's sign was present, and her urine had little calcium in it as indicated by the Sulkowitch test. She had no evidence of cataract or cerebral calcification, and an electroencephalographic tracing was normal. Laryngoscopic examination showed that she had left recurrent laryngeal palsy and a lesion of her left superior laryngeal nerve. Her serum calcium concentration was 8·6 milligrammes per 100 millilitres, her serum inorganic phosphorus content 5·3 milligrammes per 100 millilitres, and her total serum protein content 7·5 milligrammes per 100 millilitres. Her cerebrospinal fluid pressure was 130 millimetres, and she had no papilloedema. She was given a diet of low phosphorus and calcium content, and 150,000 units of vitamin *D*, 15 grammes of calcium gluconate and two teaspoonfuls of "Amphojel" each day. One month later her calcium intake was increased by stopping the administration of calcium gluconate and starting the administration of 20 grammes of calcium lactate daily. She was maintained well and with normal serum calcium concentrations for the next six months.

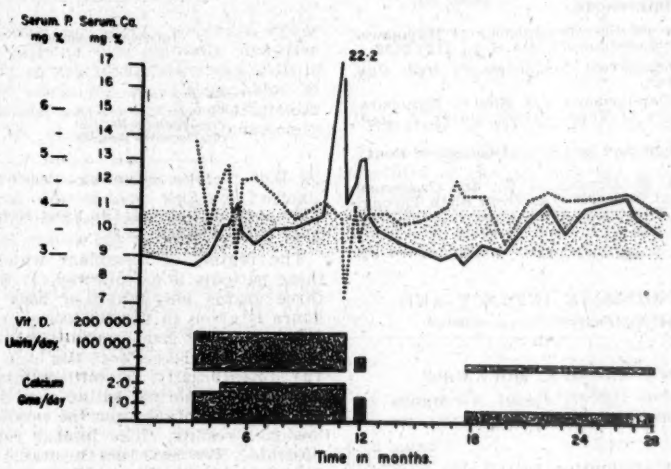

FIGURE II.

Serum calcium and serum inorganic phosphorus concentrations of a patient with post-operative hypoparathyroidism during treatment with calcium and vitamin *D*, showing an episode of acute hypercalcæmia.

In August, 1952, tincture of belladonna was prescribed to diminish nocturnal mucus secretion, which was troublesome on account of her laryngeal hemianæsthesia. Twelve days later she was admitted to hospital with a provisional diagnosis of belladonna intoxication. She had become vague and slightly disorientated, and she complained of blurring of vision, difficulty with accommodation, and a very dry mouth. She had been vomiting, had attacks of palpation and dyspnœa and had recorded her own pulse rate as 150 per minute. Her pupils reacted sluggishly to light, but were not dilated, her pulse rate was 120 per minute with some extrasystoles, her blood pressure was 150 millimetres of mercury, systolic, and 110 millimetres, diastolic (previously 150 millimetres, systolic, and 100 millimetres, diastolic), and all her tendon reflexes were exaggerated. When her serum calcium concentration was found to be 22 milligrammes per 100 millilitres, all anti-tetany treatment was stopped. Her condition improved as her serum calcium level fell, though difficulty in accommodation persisted for some weeks in spite of the withdrawal of belladonna. Careful inquiry failed to reveal any increased intake of calcium or vitamin *D* prior to the development of hypercalcæmia.

Two weeks later, treatment was recommenced by the daily administration of 50,000 units of vitamin *D* and 12 grammes of calcium lactate; but her serum calcium level rose to 13·1 milligrammes per 100 millilitres in fourteen days, so all anti-tetany treatment was suspended for six months. Her serum calcium level gradually fell to 8·7 milligrammes per 100 millilitres. She is now maintained in a clinically and biochemically normal condition on a diet of low calcium and phosphorus content, 20,000 units of vitamin *D* per day and six grammes of calcium lactate per day.

No reason for this patient's hypercalcæmia can be put forward, other than that some remaining parathyroid tissue resumed secretion. This supposition is supported by the small dose of vitamin *D* that is now needed to maintain her serum calcium level. Her symptoms were those of acute hypercalcæmia, and we were impressed with their resemblance to those of atropine overdosage. This patient clearly indicates the need for close control of treatment by serum calcium determinations.

Patients with hypercalcæmia from overdosage with vitamin *D* usually respond to withdrawal of the vitamin. The acute phase of hypercalcæmia may rapidly be reversed by the intravenous administration of an infusion of disodium ethylene diamine tetraacetate. This chelating agent forms a very stable unionized complex with calcium and is excreted in the urine. In an emergency one may administer 10 to 20 grammes intravenously and obtain a satisfactory lowering of the serum calcium level (Plimpton, 1953).

We have observed a group of eight patients with hypoparathyroidism for periods varying from six months to three and a half years while they have received treatment as outlined earlier in this paper. None has had tetany unless treatment was suspended. The maintenance dose of "A.T.10" has been 1·25 to 2·50 milligrammes daily (1·14 to 1·6 milligrammes per square metre), that of vitamin *D* 100,000 to 200,000 units daily (53,000 to 132,000 units per square metre), and that of calcium gluconate or calcium lactate 10 to 24 grammes daily (0·9 to 2·04 grammes of calcium per square metre). One patient whose history has been given is excluded from these averages, since she requires only 20,000 units of vitamin *D* (10,000 per square metre) each day. All these patients have taken a diet of low phosphorus and calcium content and "Amphojel". Four other patients who are being observed at the present time follow the same pattern of response as the first eight, but have not been maintained for six months yet.

We have found that 1·0 milligramme of "A.T.10" corresponds to about 80,000 units of vitamin *D*, as "Ol Vita D", when patients who have not responded to "A.T.10" are excluded from consideration. In practice this means that 50,000 units of vitamin *D* are substituted for each capsule or 0·5 millilitre of "A.T.10" (0·625 milligramme) without significant alteration of the serum calcium levels.

Acute post-operative tetany is readily controlled by the intravenous injection of 10 to 20 millilitres of 10% calcium gluconate solution, and this form of tetany is often transient. Acute disturbances of the central nervous system, such as fits and psychic symptoms, are best controlled with barbiturates for the first few days whilst the effects of a raised serum calcium level are taking place.

Cataracts must be dealt with by surgical means, and contact lenses may be worn by some patients. Ectodermal changes should be thoroughly investigated for the presence of fungal infection and appropriate measures instituted, though the response to treatment may be poor. The need for thyroid medication after thyroidectomy should not be overlooked in parathyroprivic patients.

An adequately treated parathyroprivic patient may continue to have a persistently raised serum phosphorus level

without any deleterious effect, though the serum calcium level has been maintained constant for some time. Though this is a common finding in treated patients, renal function should be checked. This phenomenon has been explained on the basis that vitamin *D* has less effect on the renal clearance of phosphorus than on calcium absorption.

Summary.

1. The management of patients with chronic hypoparathyroid tetany has been described and illustrated by two case reports.

2. Adequate treatment will eliminate acute attacks of tetany, and the chronic complications will not occur.

3. The necessity for frequent estimations of the serum calcium level and for continuing treatment for the rest of the patient's life has been stressed as a small price to pay for protection from irreversible damage.

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PURULENT MENINGITIS IN INFANCY AND CHILDHOOD.[1]

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I HAVE no intention of attempting to tell you how you should treat meningitis. Not only would that be presumptuous of me, but further, Dr. Hattie Alexander has laid down the principles of treatment. Rather I will tell you of the strategy and tactics which have been employed at the Royal Alexandra Hospital for Children in this "battle of the stiff neck". Then, remembering that "the victory is twice itself when the victor brings home full numbers", I shall tell you of the results we have achieved. From these results it may be possible to find if, and where, the treatment has been at fault.

The period of this study is from July, 1950, to June, 1953. I have chosen this period, firstly, because I have been on the full-time staff of the Children's Hospital during this time and have had access to all these patients. I have had a part in their hour-to-hour and day-to-day management, and have also been a member of that committee of the hospital whose function it is to make recommendations for the treatment of patients with meningitis. Secondly, the period that has elapsed even since the treatment of the most recent patients is adequate for defects to show up when patients are followed after their discharge from hospital.

About 400 patients suffering from purulent meningitis have been admitted to hospital during this time. From these I have selected three groups only for study. These present our three least common forms of purulent meningitis and those in which our worst results are obtained. They are as follows: (i) neonatal meningitis; (ii) pneumococcal meningitis; (iii) influenzal meningitis.

It has been said that there are only two main types of speakers: those who have a message to deliver and those who show lantern slides. Lest you may think that I am setting myself up as a prophet in this field, I propose to show a number of slides to illustrate our results.

[1] Read at a meeting of the Section of Paediatrics of the New South Wales Branch of the British Medical Association on October 13, 1953.

Neonatal Meningitis.

Although I have no personal experience of the treatment of neonatal meningitis before the development of antibiotic and chemotherapeutic agents, I think that it was then usually a fatal disease, and that most of the few survivors suffered from distressing sequelæ. My reason for thinking this is that the same statement is still true.

By "neonatal meningitis" I mean purulent meningitis which has its onset in the first month of life, although I have excluded from this group neonates with pneumococcal meningitis and have included them under that heading. I have also excluded patients with lesions such as a myelomeningocele.

TABLE I.

Infecting Organism.	Number of Cases.
Bacillus coli	7[1]
Proteus	4[1]
Friedländer's bacillus	1
Streptococcus pyogenes	1

[1] One patient had a double infection.

As seen in Table I, the most frequent offender is *Bacillus coli*, with proteus next.

The régime of treatment which has been adopted for these patients is as follows: (i) Sulphadiazine. A dose of three grains per pound of body weight per twenty-four hours is given in divided doses at intervals of four hours. Infrequently it has been necessary to use the intravenous route. Then a lesser dose has been used. (ii) Streptomycin. (*a*) Intrathecally, 50 milligrammes are injected in five millilitres of normal saline once daily until five successive attempts at culture from the cerebro-spinal fluid have given negative results. The lumbar route has been used when possible. We have not hesitated to use the cisternal or ventricular route when difficulty was experienced in tapping the lumbar pond. (*b*) Intramuscularly, 50 milligrammes per kilogram of body weight per twenty-four hours are injected in two equal doses at intervals of twelve hours. (iii) Other antibiotics. Penicillin, chloramphenicol, aureomycin and terramycin have been used when sensitivity tests indicated that the organism was sensitive. Streptomycin therapy has been suspended then if the organism is shown to be insensitive.

Streptokinase and streptodornase have been administered intrathecally to one patient.

Twelve patients have been so treated. I am impressed to some extent by the high masculinity in this small series—nine out of twelve. Most of these patients have been referred to us within forty-eight hours of the development of symptoms. The actual periods were as follows: less than twenty-four hours, four patients; twenty-four to forty-eight hours, three patients; more than forty-eight hours, five patients.

The predisposing causes may be summarized as follows: obstetrical difficulty, eight cases; umbilical sepsis, three cases; prematurity, one case; *icterus gravis neonatorum*, one case; no predisposing cause, two cases.

A large number of these patients encountered major difficulty during their entrance into this world. By obstetrical difficulty I mean something of the order of a *placenta prævia*, and not merely a "low forceps" delivery.

In relatively few patients was a clinically detectable umbilical infection found. In most cases no focus of infection was found anywhere outside the meninges.

In spite of all this effort, none of these patients is still alive. The longest period of survival was three months, and this patient, although cured from the bacteriologist's point of view, developed gross hydrocephalus with extensive subdural effusions.

Pneumococcal Meningitis.

By comparison with the picture in neonatal meningitis, which may fairly be termed tragic, the results obtained in pneumococcal meningitis need be referred to only as gloomy. The results are somewhat better than those in tuberculous meningitis.

To be fair, one must point out that these results are somewhat comparable with those of Dowling and his colleagues. They are not all comparable with some brilliant overseas series.

We have had 28 patients in these three years, including one patient who had two relapses. The sex incidence of 17 males to 11 females is reflected throughout the results, and for the sake of simplicity I have omitted sex distribution in the analysis. Of these 28 patients, 11 have died.

The 17 survivors I have attempted to trace by letter and by interviews where possible. Three patients I was quite unable to trace.

Two patients were classed as having achieved "poor results". One of these patients was mentally defective before the meningitis and so the result here was a little difficult to classify. The other has a hydrocephalus of communicating type, for which a spino-ureteral anastomosis has been performed. He is mentally and physically defective, and takes fits.

Twelve patients have achieved a "good result": that is, their mental and physical development appears normal. In the case of some, the time that has elapsed since the completion of treatment is only a few months, but defects always show up early.

The treatment offered to these children I shall describe only briefly, as follows. (i) Sulphadiazine. (*a*) The oral route has been used where possible. The dosage has been three grains per pound of body weight per twenty-four hours in equal doses at intervals of four hours for patients weighing up to 25 pounds. Over this weight two grains per pound have been given. The duration of treatment has been seven days. This is followed by half dosage for a further seven days. (*b*) The intravenous route has been used in the case of comatose children or children in convulsions on their admission to hospital, or when vomiting has made it necessary. The dose has been 0·05 gramme per kilogram of body weight every six hours, and the intravenous route has been used until oral therapy is possible. Blood sulphonamide levels have not been determined as a routine procedure, but the usual level is 10 to 15 milligrammes *per centum*. (ii) Penicillin. (*a*) Intrathecally, an initial injection of 20,000 units in four millilitres of normal saline has been given in every case. Since October, 1952, this has been repeated daily or more frequently for three or four days. (*b*) Intramuscularly, a dose of 250,000 units for infants, rising to 1,000,000 units for children aged ten to thirteen years, has been given every two hours. Since October, 1952, these doses have been doubled. After three days the time interval between doses has been increased provided that the patient is improving. Penicillin therapy has been continued for ten to twelve days. (iii) Chloramphenicol. This has been used since October, 1952, when the oral route could be used. This combination of antibiotics has the sanction of Dr. Hattie Alexander. The dosage is 100 milligrammes per kilogram of body weight per twenty-four hours. This is given in equal doses at six-hourly intervals. More recently the dose has been doubled, but none of the patients in this survey has received the higher dosage. (iv) Sedation. Routine sedation with phenobarbitone has been practised only since January, 1953.

Twelve known good results in 28 attempts represent a rather poor return. In individual cases one is inclined to find excuses for an unhappy result by saying "this patient was referred too late", "that patient was treated with inadequate chemotherapy before admission", and so on. This has prompted me to look into some of these factors.

Focus of Infection.

By "focus of infection" I mean a middle-ear infection, paranasal sinusitis, or pneumonia. Ten patients had such a focus—in two it was discovered in the mastoid only at autopsy. Of these ten, at least six reached a happy conclusion to their illness, although one patient had two relapses. By contrast, of 18 patients with no detectable focus, eight died and two had bad results—a total wastage of at least 10 out of 18.

TABLE II.

Result.	Focus Present.	No Focus Present.
Deaths	2	8
Bad results	0	2
Good results	6	6
Relapse	1	0
Not traced	1	2
Total	10	18

Duration of Illness Prior to Admission to Hospital.

In a retrospective study, particularly where more than one-third of the patients had a focus of infection outside the meninges, the duration of the meningitis prior to admission to hospital, as judged from the symptoms, is difficult to assess. With this reservation I offer you these figures for what they may be worth.

TABLE III.

Duration of Symptoms Prior to Admission to Hospital.

Result.	Less than Twenty-four Hours.	Two to Six Days.	Seven Days or More.
Good results	2	4	6
Bad results	0	1	1
Deaths	6	3	2
Not traced	1	1	1
Total	9	9	10

Of nine children stated to be perfectly well twenty-four hours prior to their admission to hospital, six died. Three of these deaths occurred within twenty-four hours of admission to hospital, suggesting a massive overwhelming infection. By contrast, when the disease had been present for a week or more, six out of ten patients staged a satisfactory recovery.

TABLE IV.

Effect of Treatment Prior to Admission to Hospital.

Result.	Treatment Given.	Treatment Not Given.
Good results	9	3
Bad results	1	1
Deaths	2	9
Not traced	2	1
Total	14	14

The Effect of Treatment Given Prior to Admission to Hospital.

The question of treatment prior to admission to hospital is closely bound up with the presence of a focus outside the meninges, and with treatment prior to admission. It

is not possible to separate these three factors without reducing this series to individual case histories. On the surface, however, it is obvious that those patients given even suboptimal treatment with sulphonamides or penicillin or both do better than patients not so treated. Of 14 "pre-treated" patients, nine had good results, whereas of 14 "untreated" patients, nine died and one had a bad result.

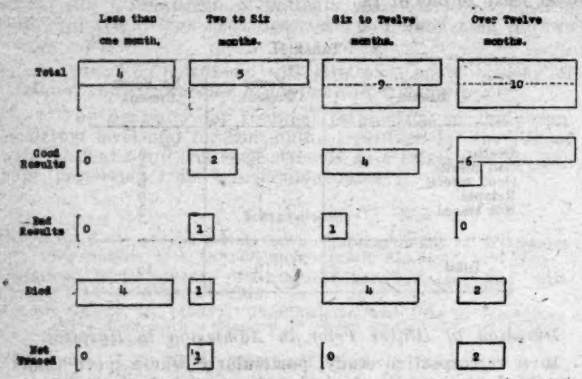

FIGURE I.
Pneumococcal meningitis: age of patient.

The Age of the Patient.

The age of the patient is, I think, a really significant feature in this group of cases, and accounts in some measure for our staggering losses. If only the four patients, who all died, in that catastrophic period of life, the first month, were excluded, the mortality rate falls to 29%. Under the age of twelve months, nine out of 18 patients died, but only two deaths occurred among 10 patients who were aged more than twelve months.

TABLE V.
Effect of Convulsions.

Result.	Convulsions Present.	No Convulsions.
Good results	8	4
Bad results	1	1
Deaths	3	8
Not traced	1	2
Total	13	15

Convulsions.

Christopher Ounsted, writing in *The Lancet* over two years ago, was most impressed about the evil influence of convulsions occurring during purulent meningitis, particularly in patients aged under four years. One must remember that his total series consisted of only 90 patients, and of these only 11 had pneumococcal meningitis. Consequently the conclusions he draws from the group as a whole are not necessarily applicable in pneumococcal meningitis.

Of our own patients, 13 were in convulsions on their admission to hospital or had convulsions during their acute illness, yet eight of them finished with a good result. Of 15 who did not have convulsions, eight died and one finally had a bad result. Only four are known to have finished well.

The State of Consciousness on Admission to Hospital.

I have had the clinical impression that a child in coma on admission to hospital had a worse outlook than one not in coma. The figures presented here do nothing to support this idea. Perhaps if the three children who were not traced could be classified, the trend might be very slightly clearer.

Cerebro-Spinal Fluid Findings.

The protein level in the cerebro-spinal fluid does not appear significant in our patients, and I have not attempted its record here. A report by the bacteriologist, "organisms very profuse on smear", has a shattering effect on the patients' chances. Only three out of 11 such patients survived.

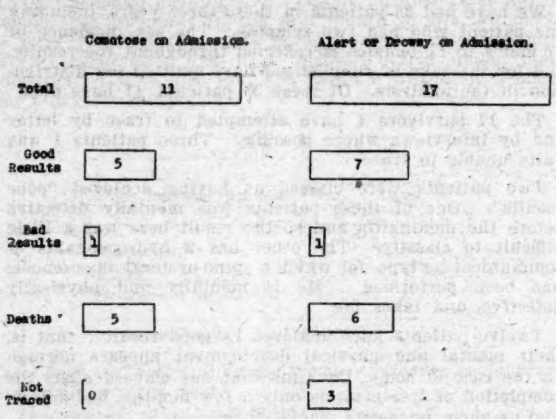

FIGURE II.
Pneumococcal meningitis: effect of state of consciousness.

A cell count of 1000 per cubic millimetre or less is only slightly less ominous. Of course, in most patients with a large number of organisms in the cerebro-spinal fluid, the cell count is also low.

Subdural Effusion.

Subdural taps have been performed on only four patients with pneumococcal meningitis. A positive result was found in two.

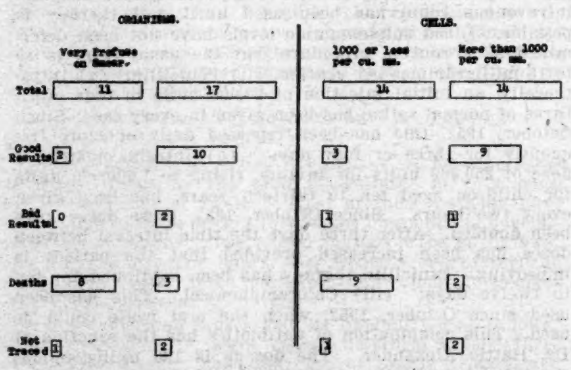

FIGURE III.
Pneumococcal meningitis: influence of findings in cerebro-spinal fluid.

Influenzal Meningitis.

Influenzal meningitis is our third most common form of purulent meningitis, and in this we obtain much better results than in pneumococcal meningitis. However, they are such that there is no room for complacency.

We have had 70 patients with this condition in the three-year period under consideration. Of these, 38 were males and 32 females; this sex ratio is maintained throughout the analysis of the results.

Twelve patients have died. Of the survivors (58) I have been unable to trace nine. Forty-nine patients have been traced and four of these have been classed as having achieved bad results. It was apparent at the time of all four patients' discharge from hospital that the results would be bad. One patient was grossly defective mentally and had convulsions. She died five months after her discharge. The other three were hemiplegic. One of these had major seizures, but these are now controlled; she is slightly defective mentally. A second has major seizures which are in some measure under control; he is grossly defective mentally. The third is grossly defective mentally, but does not suffer from seizures.

TABLE VI.

Effect of Distance from Treatment Centre.

Result.	Country.	Metropolitan Area.
Good results	6	39
Bad results	2	2
Deaths	4	8
Not traced	5	4
Total	17	53

Forty-five patients appear to be developing normally, both physically and mentally.

There has been little variation in the régime of management of these children over the period under consideration.

1. Sulphadiazine has been given to all. The dosage has been the same as that for patients with pneumococcal meningitis. The oral route has been used when possible, and the intravenous route only when oral medication was not possible because of vomiting or other factors.

2. Antiserum (rabbit antihæmophilus Type B) has been given to all patients. The dose has been 120 mils given intramuscularly to all except the smallest infants, to whom a dose of 90 millilitres has been given. Hyaluronidase has been given in conjunction with the serum injection. The routine use of antiserum has now been abandoned.

3. An initial intrathecal injection of 50 milligrammes of streptomycin in five millilitres of normal saline has been given in every case. When oral administration of chloramphenicol was not possible, the intramuscular injection of streptomycin in a dose of 20 milligrammes per pound of body weight per twenty-four hours in two doses at intervals of twelve hours, together with an intrathecal injection of 50 milligrammes once a day, has been continued until chloramphenicol given by mouth has been retained. This has been necessary because no preparation of chloramphenicol for parenteral use has been available.

4. Chloramphenicol has been used in the treatment of all patients except those who died before this could be given. The oral route has been the only one available. The dose has been 100 milligrammes per kilogram of body weight per twenty-four hours in four equal doses at intervals of six hours. This has been continued for twelve days. More recently, to follow the example of Hattie Alexander, the dose has been increased to 200 milligrammes per kilogram.

5. Regular sedation with phenobarbitone has been used only since January, 1953.

6. Blood transfusion has been used very frequently, because the development of a hæmolytic type of anæmia has been frequent in these children. This appears to be related to the antiserum and is being studied by Dr. J. Margolis at our hospital. It will be the subject of a later paper.

If we again appraise these results from the point of view of the fault being in our stars and not in ourselves, the most obvious avenue to explore is the type of patient admitted to hospital. This hospital accepts children suffering from influenzal meningitis from all parts of this large State. Some children at the time of admission to hospital are already classed as "bad results" by the people treating them and are sent to us to see if anything further can be done. This is reflected to some slight extent in the separation of patients into two groups: those referred from the metropolitan area and those from country areas.

In making this division I do not mean to imply that children are badly treated in country areas. I am merely pointing out that patients referred from country areas present, in some cases, "bad results" following what every-

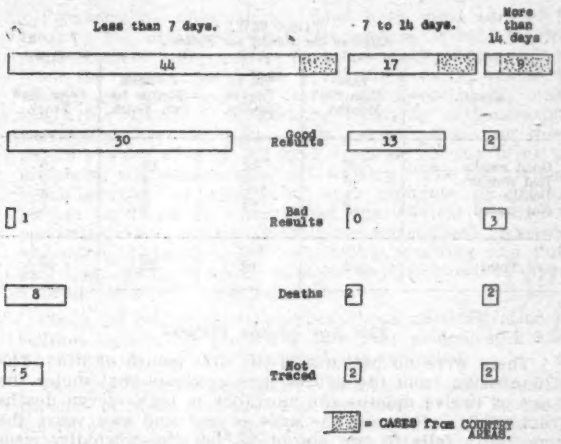

FIGURE IV.

Influenzal meningitis: duration of symptoms.

one would consider adequate treatment. They are then referred to us, because they present bad results, to see if anything further can be done for them. Four deaths and two bad results out of 17 means a wastage of rather more than one-third. The fact that 53 patients from metropolitan areas suffered eight deaths and two bad results means a wastage of just under one-fifth, and this is indeed bad enough.

The Duration of Symptoms Prior to Admission to Hospital.

The assessment of the duration of meningitis in a retrospective study is apt to be fallacious. Of 17 patients with a history of twenty-four hours' illness or less, five died; three of these died within twenty-four hours of their admission to hospital, which implies an acute overwhelming infection. Of 27 patients with a history of two to six days, only three died, and one had a bad result. This is not very dissimilar to the results obtained in the 17 patients with a history of one to two weeks.

With a history of more than two weeks, however, at least five out of nine patients, that is more than half, either died or suffered a bad result.

TABLE VII.

Effect of Treatment Prior to Admission to Hospital.

Result.	History of Less than Twenty-four Hours' Duration.		History of More than Twenty-four Hours' Duration.	
	Treated.	Untreated.	Treated.	Untreated.
Good results ..	4	7	22	12
Bad results ..	0	0	4	0
Deaths	1	4	5	2
Not traced ..	1	0	3	5
Total	6	11	34	19

Treatment Prior to Admission to Hospital.

The question of treatment prior to admission to hospital is intimately bound up with the duration of symptoms. I have therefore split the figures into two groups: those relating to a history of twenty-four hours or less, and those to a longer history. The trend to be seen in these figures is, I think, that with a history of twenty-four hours or less, treatment, even if suboptimal, tends to help the patient. However, if suboptimal treatment is continued for a longer period the outlook is adversely affected.

TABLE VIII.
Effect of the Age of the Patient.

Result.	Less Than Six Months.	Six to Twelve Months.	Thirteen Months to Two Years.	Over Two Years.
Good results ..	3	12	14	16
Bad results ..	0	0	4	0
Deaths	2	5	2	3
Not traced ..	0	2	2	5
Total	5	19	22	24

The Age of the Patient.

There were no patients in the first month of life. The impression from the figures here suggests that under the age of twelve months the mortality is high—seven deaths out of 24. Between the ages of one and two years the mortality falls to two out of 22, but the morbidity rises to four out of 22; that is, the total wastage is still high, at six out of 22. Over the age of two years the outlook improves, but five patients here could not be traced.

TABLE IX.
Effect of Convulsions.

Results.	Convulsions.	No Convulsions.
Good results	6	39
Bad results	2	2
Deaths	6	6
Not traced	1	8
Total	15	55

Effect of Convulsions.

In recalling Ounsted's paper to you, I would remind you that only 17 of his patients suffered from influenzal meningitis. Our own figures strongly support the idea that convulsions have an adverse effect. Of 15 patients who were having convulsions at the time of their admission to hospital or who had convulsions during their illness, six died and two finished badly, a wastage of more than half.

TABLE X.
Effect of Mental State on Admission to Hospital.

Result.	Comatose.	Alert or Only Drowsy.
Good results	9	36
Bad results	2	2
Deaths	10	2
Not traced	3	6
Total	24	46

Effect of State of Consciousness on Admission to Hospital.

Children who were in coma at the time of their admission to hospital number 24 out of 70, rather more than one-third. Nearly all the deaths (10) and half the known bad results occur in this group, making a wastage of at least one-half.

TABLE XI.
Cerebro-Spinal Fluid Cell Content.

Result.	Number of Cells per Cubic Millimetre.		
	0 to 999.	1000 to 4999.	5000 or More.
Good results	11	19	15
Bad results	1	3	0
Deaths	1	4	7
Not traced	2	5	2
Total	15	31	24

Cerebro-Spinal Fluid Changes.

The cell count in the cerebro-spinal fluid appears to have some influence, in that the greatest death rate of seven out of 24 occurred in the group with more than 5000 cells per cubic millimetre. The smallest wastage occurs in patients with less than 1000 cells per cubic millimetre.

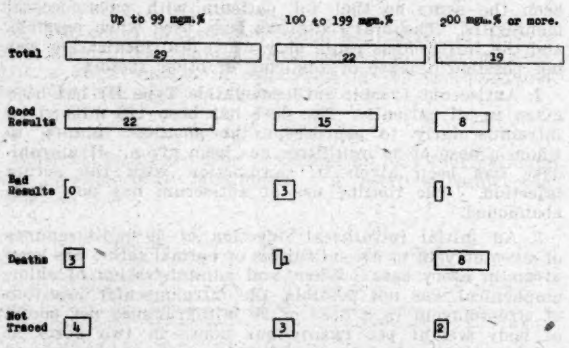

FIGURE V.
Cerebro-spinal fluid changes: protein.

The protein reading is an even more serious indicator: an amount of 200 milligrammes per 100 millilitres or more means that the patient has almost an even chance of dying or finishing with a bad result. A figure of less than 100 milligrammes per 100 millilitres greatly favours the patient's chances.

Subdural Effusions.

Subdural tap was performed on only seven patients, and a positive result was obtained in two cases.

Discussion.

As the editor of *The Lancet* (1952), amongst others, points out, the results obtained in any illness which is potentially curable by antibiotics depend on the following: (i) early diagnosis, (ii) optimal chemotherapy, (iii) thorough treatment of complications.

When I speak of "early diagnosis" I am conscious of the fact that in a large children's hospital one usually sees the patients when the disease is obvious, and we are not very often faced with the management of these children from the onset of the disease when

the diagnosis is often very difficult. I am unaware neither of the difficulty of early diagnosis nor of my own fallibility in this diagnostic field. Consequently I am in no position to exhort others to make an early diagnosis. Furthermore, in the case of neonatal meningitis, it does not seem to matter whether a diagnosis is made early or late. The outlook for the child in this series is the same. In pneumococcal meningitis very often the disease is so fulminating that if a diagnosis is possible early the outlook is often still very poor, especially in the very young, with our present treatment. In influenzal meningitis, too, there is a malignant form of the disease which can overwhelm the patient's defences within twenty-four to forty-eight hours. In the less fulminating form of the disease the results become really bad only when symptoms have been present for more than two weeks.

Despite all this, there is no doubt that the sooner the diagnosis can be made, the better is the outlook for the patient. Meningitis is still one of the most urgent of the medical emergencies.

Optimal chemotherapy can really never be a fixed quantity. Dosage and duration of administration will change. New drugs will be developed. Our present dosage of penicillin for pneumococcal meningitis may be too low for very young patients and for those with a large number of organisms in the cerebro-spinal fluid. The dosage of chloramphenicol in all forms of meningitis should be double that which we have been using. When a satisfactory preparation of chloramphenicol for parenteral use is freely available, it is probable that streptomycin, except for an initial intrathecal injection, will no longer be used in influenzal meningitis.

On the subject of optimal chemotherapy I would say a word in support of the practitioner who examines a patient, particularly a baby, realizes that he is far from well, and prescribes penicillin or sulphadiazine, or both. My own feeling is that this practice, though unscientific, is often life-saving, if that patient is developing purulent meningitis of any type. But unless that patient is referred for lumbar puncture and full treatment as soon as the diagnosis of meningitis is suspected, it may well be that the life which is saved is rendered valueless by too long continuation of suboptimal treatment.

Such early and empirical treatment probably modifies the size and virulence of the infective dose of the organism, and this is of particular benefit in the treatment of the very young, in whom "resistance" appears ill trained. Prolonged suboptimal treatment allows a subacute process to continue to cause damage to the central nervous system and may well encourage the development of organism insensitivity to antibiotics.

In the field of thorough treatment of complications a word of self-criticism is not out of place.

Despite our own inconclusive figures regarding convulsions in pneumococcal meningitis, I have no doubt that phenobarbitone prophylaxis is desirable for every patient with any type of purulent meningitis, at least until the temperature becomes normal; yet this has been in use only since the beginning of 1953. Moreover, the treatment of children with *status epilepticus* in purulent meningitis—which has a very bad prognosis—should be more energetic than it has been.

As early as 1950, McKay and his colleagues published a preliminary report on subdural effusion in purulent meningitis. More recently they have written a very full report stressing the frequency of its occurrence, particularly in children aged under twelve months. They also found a high incidence of membrane formation necessitating craniotomy.

The indications for subdural taps, as listed by these enthusiasts, seem to me quite conservative. They are as follows. (i) Failure of the temperature to decline progressively. If the temperature is not subsiding after seventy-two hours of treatment, this is regarded as a strong indication. (ii) A positive cultural result from cerebro-spinal fluid collected forty-eight hours after the commencement of treatment. (iii) Convulsions in the "convalescent period". (iv) Focal convulsions at any time. (v) Vomiting in the "convalescent period". (vi) Gross neurological abnormality. (vii) The clinical impression that the course is unsatisfactory.

We are now performing subdural taps more frequently than ever before, but the tendency is still to postpone their performance longer than need be. Moreover, if a puncture through the lateral angle of the fontanelle gives a negative finding, this is often regarded as "good enough". It is likely that such a finding is not good enough and that, if the indications for subdural taps are present, and the taps through the fontanelle are unproductive, the making of burr holes should be considered.

Furthermore, although we have been most earnest in treating the meningitis in these patients, it may be that some of them suffer a little from the treatment as well as from the meningitis. This is nowhere better instanced than in our determination (held until recently) to "make the urine alkaline" in patients receiving sulphadiazine, particularly by the intravenous route. Some of these patients were already suffering from or on the brink of metabolic alkalosis because of vomiting. The intravenous administration of relatively large amounts of sodium lactate produced or exaggerated the clinical picture of persisting coma, spasticity of limbs, generalized anasarca, abdominal distension, and continuing vomiting and fluid diarrhœa, with chemical changes in the blood of hypokalæmic hypochloræmic alkalosis.

Since the omission of the intravenous administration of sodium lactate this picture is now very seldom seen and, when seen, is quickly recognized and remedied.

The final point I should like to make is that when the parents of these patients are interviewed they state in almost every case that the child is more "difficult" than his siblings or friends of his own age—"temper tantrums" occur with a frequency greater than average. Without losing sight of the severity of the illness, I put forward as a suggestion the idea that some of this may be due to separation from parents and to the measures necessary in treatment. And with this in mind I would make a plea for the early reduction or suspension of "needle work", particularly the lumbar puncture needle, provided clinical progress is satisfactory, and for the patients' early return to their own homes provided adequate supervision is possible.

Summary.

1. A series, over a three-year period, of 110 patients suffering from purulent meningitis is presented. The survivors have been followed after their discharge from hospital.

2. Twelve patients were suffering from neonatal meningitis. All died despite the fact that seven were admitted to hospital within forty-eight hours of the onset of symptoms. It is suggested that obstetrical difficulty is an important ætiological factor. The most common organisms were *B. coli* and *B. proteus*.

3. Twenty-eight patients suffered from pneumococcal meningitis, and 11 died. Eighteen patients were aged twelve months or less, and four were aged less than one month. The younger the patient, the worse was the outlook. Suboptimal dosage of penicillin or sulphonamide before admission to hospital appears to improve the prognosis. Very profuse organisms and a low cerebro-spinal fluid cell count make the outlook much worse.

4. Seventy patients with influenzal meningitis are discussed. The deaths numbered 12 and the total wastage (mortality *plus* morbidity) was 16. Late diagnosis with prolonged suboptimal treatment made the outlook bad. The development of coma or convulsions is a bad prognostic sign. A high cerebro-spinal fluid protein content is an unfavourable feature.

5. The régimes of treatment for these types of meningitis in use at the Royal Alexandra Hospital for Children are described and some suggestions are offered as to how these régimes may be modified.

Acknowledgements.

I am pleased to have this opportunity to thank the honorary medical staff of this hospital. They have been available at all times for help and advice (and comforting words) in the management of patients not progressing satisfactorily. They have, moreover, allowed me to follow their patients after discharge from hospital. I should also like to pay tribute to the hard work of the nursing staff and the resident medical staff, and to record my gratitude.

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EXTRADURAL HÆMORRHAGE.

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THE literature already abounds with accounts of extradural hæmorrhage. A recent review of the subject by Bradley (1952) lists 78 selected references to papers covering apparently all aspects of the condition. Yet there is abundant evidence from the published figures that we fall far short of the ideal as regards both accuracy of diagnosis and success of treatment. Further, it is suggested that we still have not in proper perspective the frequency, the varying clinical picture, the post-operative complications and the results of treatment of this lesion.

This present paper deals with twelve cases of extradural hæmorrhage treated in a period of twelve months—from September, 1952, to September, 1953—at the Alfred Hospital, Melbourne. The case incidence, distribution of lesions, presenting features and post-operative course are studied and correlated. Such an analysis indicates the features by which the individual cases of a natural series were recognized, and illustrates the variety of presentation which must be expected, and the results which may be obtained.

Incidence.

Twelve cases of extradural hæmorrhage in as many months in one general hospital may appear to be a surprisingly large number. The writer suggests that this is due not to an unusual disproportion of cases, but rather to a high incidence of correct diagnosis, made possible by alert observation of subjects of head injury by the resident medical and nursing staffs. The number of undiagnosed cases is unknown, but was probably correspondingly small. It is fair to note that in the same period a further eight patients were submitted to craniotomy with a tentative diagnosis of extradural hæmorrhage. Of these, three were found to be suffering from acute subdural hæmorrhage and two from intracerebral hæmorrhage—all lesions requiring surgical intervention. The remaining three patients showed no apparent adverse effect from a "needless" craniotomy. A record of a lesser proportion of explorations with negative results would suggest either extraordinary diagnostic accuracy or the possibility that a considerable number of cases might have been missed.

Table I shows the details of occurrence of the several cases. There were only two female patients in the series, and the ages ranged from six to sixty-eight years, with the peak incidence at about twenty years. Eight cases were due to traffic accidents, in at least three of which the influence of alcohol may be suspected. Two other cases were apparently due entirely to alcoholic excess (Cases I and V). One case was the result of an industrial accident,

TABLE I.

Details of Occurrence of Twelve Cases.

Case.	Patient's Age. (Years.)	Mode of Injury.	Alcohol Involved.	Local Injury.
1	28	Hotel brawl (6 p.m.).	Yes.	Parietal contusion (simple fracture).
2	50	Riding motor-cycle: struck car.	—	Fronto-temporal depressed fracture.
3	24	Driving motor-car (6.30 p.m.).	Yes.	Parietal contusion (simple fracture).
4	32	Front-seat passenger in motor truck.	—	Compound depressed frontal fracture.
5	42	Fell off tram-car (7 p.m.).	Yes.	No sign.
6	6	Hæmophiliac: fell from cot.	—	Huge facial bruises (no fracture).
7	18	Industrial crush injury.	—	Extensive fractures.
8	18	Motor cyclist.	—	Temporal contusion (no fracture).
9	19	Pedal cyclist: hit fallen tree.	—	Frontal abrasion.
10	37	Pedestrian: struck by motor-car.	—	Parieto-temporal contusion (simple fracture).
11	16	Motor-car passenger.	—	Huge cephalhæmatoma (parietal fracture).
12	68	Front-seat passenger in motor-car.	Yes (driver).	Compound depressed frontal fracture.

whilst one was in a hæmophiliac (Case VI) and will be reported in detail elsewhere. The hour of occurrence of the accidents in which alcohol was definitely concerned is of interest. (It is alleged that excessive speed is the prime cause of a large proportion of accidents, but many surgeons would agree that alcoholic excess is more than coincidently involved. No matter what one's personal convictions may be, it would appear the height of folly to close hotels in the middle of the peak-traffic hours, as is done in this State.)

TABLE II.

Distribution of Hæmatomata.

Case.	Source.	Site.	Depth. (Centimetres.)
1	Junction of transverse and sigmoid sinuses.	Left temporal, occipital.	3
2	Anterior branch artery.	Left temporal.	2
3	Junction of transverse and sigmoid sinuses.	Left temporal, parietal, occipital.	4
4	Frontal branches of anterior branch artery.	Right fronto-temporal.	2
5	Posterior branch veins.	Right temporal.	3
6	Posterior end of superior sagittal sinus.	Right temporal, parietal, extending to base and posterior fossa.	2
7	Anterior branch artery.	Right temporal.	2
8	General oozing.	Left temporal and base.	2
9	Frontal branches of anterior branch artery.	Left frontal.	3
10	Posterior branch artery.	Right temporal.	2
11	Transverse sinus.	Left parieto-occipital.	2
12	Frontal branches of anterior branch artery.	Left frontal.	3

The extent of the local injury to the scalp varied widely from no sign of trauma in one case to compound depressed fractures in two cases. Radiographic examination was not always undertaken, but in four cases no evidence of fracture was found at operation (X-ray examination had been made in two of these). The tendency to assess the worthiness for admission to hospital of patients with head injuries on the grounds of the presence or absence of fracture is seen to be ill-founded.

TABLE III.

Presenting Features.

Case.	Consciousness.	Large Pupil.	Pulse Rate (per Minute).	Blood Pressure (Systolic). (Millimetres of Mercury.)	Hemiplegia.	Ocular Nerve Palsies.	Special Features.
1	Lucid interval (24 hours).	Small left.	64	140	Right.	—	X-ray examination.
2	Fully alert (concussion earlier).	—	60	130	Right (face).	—	Site of depressed fracture X-ray examination.
3	Comatose throughout.	Right.	150	?	Areflexic.	—	Resuscitated from apnœa.
4	Unconscious throughout.	—	70	130	?	—	Site of depressed fracture.
5	Lucid interval (two hours).	Right.	35	170	Left.	Left (3).	
6	Drowsy.	Both.	—	—	Left.	Right (3, 4, 6). Left (4, 6).	Right proptosis. Papilloedema.
7	Comatose throughout.	Right larger than left.	40	90	?	—	Cheyne-Stokes respiration.
8	Deepening coma.	—	70	130	Left.	—	—
9	Lucid interval (four hours).	Left.	50	180	Right.	Left (3).	Respiration rate, 10 per minute.
10	Deepening coma.	Right.	56	130	Left.	—	X-ray examination.
11	Conscious (concussion earlier).	Slight left.	75	120	—	Left (3, 4, 6). Right (6).	Cephalhæmatoma. X-ray examination.
12	Lucid interval (four hours).	Slight left.	50	150	Right.	—	Site of depressed fracture.

Distribution of the Hæmatomata.

Table II lists the apparent source, site and depth of each hæmatoma. The anterior branch of the middle meningeal artery was damaged in two cases, and the posterior branch in one, whilst the veins accompanying the posterior branch were separately involved in one case. In three cases small frontal branches of the middle meningeal system were responsible—an expression of the preponderance of frontal injuries resulting from traffic accidents. (The frequency of frontal injury sustained by front-seat passengers in a motor-car, who are thrown against the windscreen by sudden braking or collision, suggests the imprudence of allowing small children to ride in the front seat.) Of considerable interest is the occurrence of four cases of venous sinus injury. In three of these a fracture line ran down from behind the parietal eminence to cross the transverse sinus near its junction with the sigmoid sinus. The largest and most rapidly formed hæmatoma of the series occurred in one of these (Case III).

The sites of the hæmatomata are of interest chiefly because a burrhole made in the usually selected first site —in the temporal fossa—would have missed three of them (Cases IX, XI and XII), and would have been incorrectly placed to deal with a further three at least. The usual second (posterior branch) site for a burrhole would have discovered Case XI, but still missed Cases IX and XII. In almost all cases, however, the local scalp signs or the disposition of a fracture line (when known) correctly indicated the site for craniotomy. The extraordinarily wide spread of the hæmatoma in Case VI presented a special problem. No case of localized posterior fossa hæmatoma was recognized.

The depths of the hæmatomata varied from two to four centimetres. Some of those included are small, but the clinical course or the finding at operation of continuing hæmorrhage justifies their inclusion as lethal lesions, fortunately dealt with early. Lesser collections, as are common beneath depressed fractures with dural damage, have been excluded from this series. It will be seen later that the depth of the hæmatoma was related only approximately to the duration of the clinical course, and to the severity of the clinical state.

Presenting Features.

The grounds upon which diagnosis was made and/or operation was undertaken varied considerably. In eight cases the correct pre-operative diagnosis was established, whilst in three others (including two of the cases of depressed fracture) suspicion of extradural hæmorrhage warranted early craniotomy. Table III lists the outstanding features in each case.

Four patients only (Cases I, V, IX and XII) presented a classical lucid interval, varying from two to twenty-four hours. In case VI the patient was becoming increasingly drowsy after eleven days. Five patients were deeply unconscious throughout; two of them were obviously becoming more deeply unconscious. Two patients had recovered from concussion and were fully alert at the time of operation (Cases II and XI).

An ipsilateral dilated and fixed pupil was seen in five cases. In two of these the contralateral pupil was also dilated. In two other cases there was minimal dilatation of one pupil, and in another a slight ipsilateral constriction. In Case III, the widely dilated pupil was on the right, but the hæmatoma was on the left side. The reason for this contralateral distribution is unknown, as surgical exploration on the right side revealed no abnormality. In three cases no pupillary abnormality was detected.

Unusual palsies of external ocular movements—ipsilateral ophthalmoplegia and contralateral external rectus paralysis —were suffered in Cases VI and XI. These were both cases of slow venous hæmorrhage in the posterior part of the head—one from the sagittal and one from the transverse sinus. The position of these hæmatomata cannot alone account for the cranial nerve lesions, for similarly situated collections in Cases I and III were not so complicated. Perhaps the duration of the cases has some bearing (see Table IV).

Bradycardia was present in five cases—in some with accentuation of sinus arrhythmia or with gross irregularity of the pulse rhythm. In two of these the systolic blood pressure was raised. One patient only had a raised pulse rate (Case III), and this patient died post-operatively. (The higher proportion than usual of cases in which operation was performed before the pulse rate was raised—which is a late and desperate sign of circulatory decompensation—is associated with the good prognosis in the series as a whole.) Two patients (Cases III and VII) showed signs of surgical shock.

Some degree of lateralizing hemiplegia was usually found. This varied from a minimal facial weakness just before operation in Case II, and an extensor plantar reflex as an isolated abnormality in two other cases, to gross spasticity and immobility. Some patients were areflexic and flaccid, so that no lateralizing paralysis was detected. In Case VIII the hemiplegia was ipsilateral with respect to the extradural hæmatoma and the scalp injury, but contralateral to an associated intratemporal hæmatoma, which complicated the clinical picture.

"Central" respiratory disturbance (which excludes stertorous breathing and other airway obstruction) was gross in only three patients. In Case III the patient was resuscitated by artificial respiration from apnœa, in Case VII the patient presented with Cheyne-Stokes respiration, whilst in Case IX the patient had a respiratory rate of ten per minute. These were the patients who did not make a good recovery.

TABLE IV.
Results.

Case.	Interval Since Injury.	Complications and Special Operative Measures.	Results.	Time in Hospital.
1	42 hours.	Suture of sinus.	Complete recovery.	13 days.
2	4 hours.	Transient left lower neurone facial weakness, permanent left deafness (fracture through ear).	Otherwise complete recovery.	12 days.
3	45 minutes.	Hyperthermia. ? Gross brain damage. Tracheotomy.	Death.	8 hours.
4	2 hours.	Fractured mandible. Slow mental recovery (three months).	Apparently complete recovery.	27 days.
5	3 hours.	Slow recovery of third nerve (18 days).	Complete recovery.	9 days.
6	11 days.	Hæmophilia, *diabetes insipidus*, hyperthermia. Slow recovery.	Complete recovery except right secondary optic atrophy.	6 weeks.
7	1 hour.	Hyperthermia, pulmonary œdema. Tracheotomy.	Incomplete recovery, still improving (seven months).	6 months.
8	3 days.	Right intratemporal hæmatoma (thus left hemiplegia). Wound infection.	Complete recovery.	2 months.
9	8 hours (on admission).	Poikilothermia, Cheyne-Stokes respiration, bronchopneumonia, decubitus ulcer. Tracheotomy.	Incomplete recovery, but improving (still in hospital).	5 months.
10	3 hours.	Cerebral damage—sensory loss left hand and lips. Right deafness (fracture through ear).	Otherwise complete recovery.	20 days.
11	6 days.	Slow recovery of eye movements (two months).	Complete recovery.	16 days.
12	6 hours.	Persistent hemianæsthesia—face and hand.	Otherwise complete recovery.	25 days.

The remaining diagnostic features had to do with the evidences of local injury, which we have already seen to be usually an accurate guide to localization. In Cases II and IV the site of a depressed fracture suggested the need for early exploration (see Jamieson, 1953), and in Case XI a huge subgaleal hæmatoma (which had been aspirated thrice) increased the likelihood of finding an extradural hæmatoma.

Pre-operative Course.

When Tables II and III are read in conjunction with column 2 of Table IV—the time interval between injury and operation—several striking features are seen. The time interval varied from forty-five minutes to eleven days. This represents the rate of development of the clinical picture actually recognized as requiring surgical relief, and although some patients were operated upon earlier in their clinical course than others, this rate is closely associated with that of the development of the lesion. One would expect that approximately equal-sized hæmatomata would cause approximately equal disturbance, but the severity of the case is also determined by the rate of change. It might be expected that this rate would depend upon the size and type (whether arterial or venous) of the injured vessel, among other factors. One would not expect that a (presumably) low pressure hæmorrhage from meningeal veins or a venous sinus would constitute an acute emergency. But none of these expectations is fully realized—the urgency for treatment is not predictable on any of these grounds, except in a very general way. Case III and Case V were both examples of venous hæmorrhage, and were among those with the fastest presentations, whilst the other cases of venous hæmorrhage were amongst those with the slowest.

The variability of the various factors upon which diagnosis is classically based is very great. In Cases V and IX only the patients presented the full classical picture, the others showing only some features of it. The minimal degree or absence of pupillary signs by comparison with deep unconsciousness in Cases I, IV and XII, and the gross progression of other signs by comparison with the conscious state in Cases VI and XI, are examples of this variability. The proportion of the total clinical picture contributed by each of the several factors depends in some measure upon the site, size, and duration of the hæmorrhage. The situation is further complicated by the presence in varying type and degree of associated cerebral damage, which may largely obscure the signs of extradural hæmorrhage. To await the full development of the classical clinical picture in all its detail is to court disaster.

The great urgency of some of these cases required careful organization for successful treatment to be possible. Of Cases VII and IX, in both of which the patients were moribund upon admission, the hospital had been forewarned. Craniotomy was in progress within ten minutes of the patients' arrival, and this is doubtless why they survived. In Cases III and V the operation was commenced by a resident medical officer whilst the writer was summoned, delay being again avoided. (How many lives might be saved if medical officers could be attached to our ambulance services! They could provide accurate records of the state of the patient from the time of the accident, provide emergency treatment, such as the provision of an adequate airway, and notify the hospital of cases of urgency so that the operating theatre could be prepared and the surgeon could be summoned. This may not be impracticable at a time when some new graduates have difficulty in obtaining hospital appointments.)

Results.

In Table IV are summarized the post-operative courses and results in these cases.

There was one death, in Case III. The patient was admitted to hospital deeply comatose and apnœic, with a pulse rate of 150 per minute and unrecordable blood pressure. He was operated upon immediately after admission (only forty-five minutes after injury), but remained deeply comatose, developed hyperthemia (105° F.) and died within eight hours. Tracheotomy to secure a perfect airway, intravenous fluid resuscitation and cooling measures were unavailing. Severe cerebral damage was present, and one must reluctantly conclude that this patient was an example of those few patients who are moribund beyond surgical aid from the outset.

Two patients have made an incomplete recovery. In Case VII the patient, operated upon immediately, one hour after injury, had gross cerebral damage as evidenced by hyperthermia, pulmonary œdema and the localized neurological defects apparent in his subsequent course. After seven months he is childish and dysphasic, with poor control of his limbs, but is improving rapidly since discharge from hospital to his normal family environment. In Case IX the patient arrived at hospital very late in his course, but all was in readiness for immediate surgery. Poikilothermia, respiratory depression and profound coma showed how grave was his state, and his post-operative course was stormy. After five months in hospital he is mentally alert and speaking well, but slow to regain physical activity. This poor (so far) result is due to the lateness of the surgical intervention.

The remaining nine patients have made excellent recoveries, marred only by permanent associated damage to the ear in Cases II and X, to the sensory cortex in Cases X and XII, and to the optic fundus in Case VI. Seven of them were in hospital for only short periods of from nine to twenty-seven days. In Case VI the patient was retained for six weeks to treat associated hæmorrhages, and in Case VIII two months were required to control a wound infection—the only adverse result of surgery in the series.

The chief complications that caused difficulty were disturbances of temperature regulation and of respiration.

Three cases of hyperthermia and one of poikilothermia occurred. Routine early measurement of rectal temperature resulted in early detection of this state, and energetic cooling measures were successful, before irreversible changes had occurred, in all but one case. Tracheotomy was necessary in three cases, and in two of these (Cases VII and IX) was lifesaving during long periods of unconsciousness. The maintenance of a perfect airway and the prevention of aspiration and hypostatic pneumonia are of paramount importance at all stages of the management of any head injury.

Ocular nerve palsies were often slow of recovery, especially in Cases VI and XI, but recovery was always complete. The dilated pupil always returned to normal within a few hours except in the three cases of poor prognosis. Hemiplegia or other paralysis usually disappeared very rapidly.

There were no recurrent hæmorrhages in the series. This was ensured by (i) rigorous control of bleeding points by diathermy or suture at the primary operation, for which adequate exposure is required, (ii) obliteration of the dead space which sometimes results when the decompressed brain does not expand (in Case XII, for example, by the instillation of Ringer's solution by lumbar puncture), (iii) suture of the *dura mater* to the pericranium around the bone margins if any doubt existed as to hæmostasis, and (iv) drainage in all cases.

Case VI required special operative measures which are described elsewhere. Case VIII was complicated by the presence of an intracerebral hæmorrhage in the opposite (right) temporal lobe. This was treated by amputation of the damaged temporal pole, which resulted in no apparent neurological deficit.

Finally, dehydration therapy was not intentionally used in any case. When it was desired to lower the intracranial pressure or to prevent the occurrence of œdema, the patient was sat up (the normal pressure is then subatmospheric) to facilitate the cerebral venous return, and his airway was kept clear to prevent carbon dioxide retention and the resultant cerebral venous engorgement.

Discussion.

Extradural hæmorrhage is recognized and presented to students as a dramatically remediable lesion which is a delight to the surgeon who must manage head injuries. "However", as Bradley (1952) writes, "the mortality following extradural hæmorrhage continues to be surprisingly high, when one considers some of the results of surgery during the past ten years." He collected 27 cases of patients submitted to craniotomy at two hospitals during the previous ten years, with 15 deaths—a mortality rate of 56%. He remarked that when cases met with at autopsy, in which craniotomy was not performed, are added, the death rate is very high indeed. Statistics from other sources are in general accord with these, so that we have little cause for satisfaction with our present treatment of extradural hæmorrhage.

It is difficult to estimate the annual incidence of extradural hæmorrhage, but the figure must be quite high. To the readily obtained number for the public hospitals of a capital city must be added those cases diagnosed in private and country practice, together with an unknown number of undiagnosed cases. Hospitals in this State are not permitted to conduct post-mortem examinations in cases of death due to violence, and an autopsy is not often required by the City Coroner. Thus it is impossible to determine the proportion of undiagnosed cases, or the total mortality, and one frequently has no opportunity to discover the reasons for one's failures. But from the fact that 12 cases occurred (or were diagnosed) in one year at one hospital, it is apparent that the lesion is an important one.

The reasons for failure of treatment are chiefly two: (i) the presence of severe associated brain damage—prognosis is poor when coma is present from the beginning; (ii) late intervention, of which Case IX was almost an example. The latter and the missed diagnosis can be obviated only by a rigorous routine, such as that recommended by Hooper (1949), which formed the basis of the management of this series of cases. He stresses the following points: "(i) A lucid interval may not be present. (ii) The patient may not be stuporose or even drowsy. (iii) Œdema of the temporal fossa or of the orbit on the affected side is an important sign. (iv) The suspicion of an extradural hæmatoma is an absolute indication for an immediate radiograph of the skull. (v) The suspicion of an extradural hæmorrhage combined with X-ray evidence of a fracture line crossing a vascular channel in the bone is sufficient indication for operation, even when the clinical signs are minimal and the patient is still conscious." It is said that in the early stages after injury (some suggest a four-hour period) one should "wait and see", and that surgical intervention should not be undertaken until a firm diagnosis is made. Certainly one should not operate without full previous recourse to clinical methods of diagnosis. But any single positive indication of deterioration at an interval after head injury requires immediate consideration, and may warrant craniotomy. In cases of great urgency, one should not delay even for X-ray examination; the patient will be safe only in the operating theatre. Further delay in Cases IV, V, VII or IX might have been fatal. It may be repeated that to await the full development of the classical clinical picture, and thus certainty of diagnosis, is to court disaster.

The better-than-average results in the present series may be due to failure to diagnose the more atypical and hopeless cases (though this is considered unlikely if only because of the high incidence found and the type of case included), or to good fortune in the state of patients when presented. But the series well illustrates the signs that betoken a poor prognosis and the peril of delay. Further, the proportions of the various modes of presentation in this small series agree well with those found in larger groups.

Extradural hæmorrhage is reputedly one of the more favourable of the serious lesions found among head injuries. But in city hospitals, where cases are congregated and specialist advice and facilities are available, the mortality is about 50%. What then must the over-all avoidable mortality due to head injuries be? In the case of extradural hæmorrhage the responsibility for treatment must generally fall upon the local practitioner, but in less urgent cases the availability of expert advice might be increased. The problem is partly determined by our sparse population, which cannot support a neurosurgeon outside our main cities, and country consultations are an expensive event for either patient or surgeon. It appears anomalous, in these days, that access to this specialist treatment should depend solely upon the patient's financial resources. Perhaps an emergency specialist consultation service might be organized, financed upon the same basis as our public hospital service, to meet this need.

The increasing number of road accident fatalities, a large proportion of which result from head injuries, demands our careful study. In these days of mounting insurance and compensation awards, economic considerations alone would render well worth while a thorough head injury survey. In the field of prevention alone much useful information might be obtained, and this paper contains a few instances of lines of inquiry that ought to be reopened. We require a careful review of our existing accident services, which have been tried and, in some respects, have been found wanting.

Summary.

1. A series of 12 cases of extradural hæmorrhage, with one death, is presented.

2. The case incidence, clinical course, diagnostic features and results in these cases are analysed.

3. The urgency of the need for treatment of this lesion is stressed.

4. Common post-operative complications and special features of management are discussed.

5. The unsatisfactory state of our present treatment of this reputedly favourable lesion, even in the best equipped centres, is recognized.

6. The need for a head injury survey and for a review of our existing accident services is suggested.

References.

BRADLEY, K. C. (1952), "Extra-Dural Hæmorrhage", *Australian and New Zealand J. Surg.*, 21: 241.

HOOPER, R. S. (1949), "Complications of Closed Head Injuries", M. J. AUSTRALIA, 2: 845.

JAMIESON, K. G. (1953), "Some Clinical Aspects of Head Injuries", *Alfred Hosp. Clin. Rep.*, 3: 51.

Reviews.

Elementary Pathological Histology. By W. G. Barnard, F.R.C.P.; Third Edition; 1953. London: H. K. Lewis and Company, Limited. 10" × 7½", pp. 88, with 185 illustrations, eight in colour. Price: 17s. 6d.

PROFESSOR BARNARD has made few alterations in this third edition of "Elementary Pathological Histology" and has adhered to the simple presentation of pathological processes, encouraging quiet study of such conditions with the slide and microscope. When the student himself can see in sections these typical examples of diseased structure, he will have little difficulty in understanding the greater range of lesions he may come to examine during his course.

Within 80 pages of text, half of which do not contain a dozen lines of type, Professor Barnard introduces to the student the basic features found in most pathological processes. This is achieved by avoiding cumbersome explanations and the use of direct English with simple and effective adjectives, possessing a charm eschewed by more pretentious works. While the introduction to each section is a sufficient explanation of the nature of the condition illustrated, the statements about cell proliferation, about the segregation of cells into three germ layers and about unipotent, multipotent and totipotent cells, will no longer be accepted by many pathologists.

It is hard to pick out illustrations for special praise. Many are so excellent from all points of view. The techniques of preparation of the section, the photomicrograph and the printer's block combine to show the finest details of lesions which cannot be surpassed in teaching value. Photomicrographs of high magnification present fewer difficulties than those of low magnification, and perhaps the highest praise should be given to several illustrations of sections of large area. The general excellence of the photomicrographs is emphasized by occasional lapses from the high standard.

This book should be a help to those students finding difficulty with practical histopathology, provided they follow the author's advice to sit down with the microscope and slides as well as the book.

The Physician in Atomic Defense: Atomic Principles, Biologic Reaction and Organization for Medical Defense. By Thad P. Sears, M.D., F.A.C.P., with a foreword by James J. Waring, M.D., M.A.C.P.; 1953. Chicago: The Year Book Publishers, Incorporated. 8" × 6", pp. 308, with 53 illustrations. Price: $6.00.

THE development of atomic weapons for warfare has brought the need for measures for civilian defence. "The Physician in Atomic Defense" by P. Sears will provide an excellent starting point for those wishing to learn something of the problems involved.

The author, of the School of Medicine of the University of Colorado, had as his objectives first the presentation in non-mathematical language of the physical concepts underlying atomic fission and induced radioactivity, and then the review of the symptomatology, pathology and treatment of injuries from atomic bombs, and a description of the methods of civil defence. These he has achieved with considerable success.

In the introductory chapters, the successive stages in the growth of knowledge of atomic structure and radioactivity are traced in simple language. Then follow discussions on the general biological effects produced by radiation of various types and intensities. Information as to the types of casualties met with after the atomic bombing of Japanese cities is reviewed, and the principles of the management of these casualties are set out. The last section of some sixty pages details the organization for civilian defence.

The book is well set out, with careful explanatory diagrams, and a judicious selection of references. Much of the material on civilian defence has been obtained from United States Army and Public Health authorities. A more than usually detailed index is an advantage.

The subject matter has been based, it is stated, upon a series of lectures to medical practitioners and lay administrators. Possibly because of this, the separate sections can be read with ease even by those with limited technical knowledge.

The book can be thoroughly recommended not only to those interested in defence against atomic bombs, but also to those desiring to gain some knowledge of the importance of atomic developments to medicine.

Review of Physiological Chemistry. By H. A. Harper, Ph.D.; Fourth Edition; 1953. Los Altos, California: Lange Medical Publications. 10" × 7", pp. 338, with many diagrams. Price: $4.00.

THE fourth edition of Dr. H. A. Harper's "Review" is a successful example of an up-to-date condensation of a medical course in this subject. It has been enlarged, and the use of small, clear print, narrow margins and light but serviceable binding has made possible a good coverage of the usual text-book subjects at a reasonable cost. The whole method of production could be commended to other authors and publishers.

This edition has no important changes in chapter headings. All chapters have been revised and, where needed, footnotes contain a suitable reference to the last comprehensive review on the section. The condensed summary of reference literature has been revised. As in previous editions, the arrangement of the table of contents, index of tables and diagrams and general index have been planned for rapid use. Comparison with current editions of formal text-books show this "Review" to be an accurate and well-balanced summary for physicians and students for whose examinations it was written. It is a very useful book.

Psychosomatic Medicine: Its Principles and Applications. By Franz Alexander, M.D., with a chapter on The Functions of the Sexual Apparatus and their Disturbances, by Therese Benedek, M.D.; 1952. London: George Allen and Unwin, Limited. 8½" × 6", pp. 300, with five text figures. Price: 21s.

MEDICAL SCIENCE has long been indebted to Professor Franz Alexander for his outstanding contributions towards the better understanding of the psychosomatic approach to disease.

The subject matter of the present volume is the product of seventeen years' work in the Chicago Institute for Psychoanalysis. The author has made a detailed study of the subject and now presents a text-book which provides us with an efficient technique for the study of psychological factors in disease.

The introductory chapters are devoted to fundamental principles. The mechanism of stimulation of the sympathetic and parasympathetic nervous systems by sustained emotional tension which does not find relief in voluntary behaviour is discussed. The vexed question of the specificity of emotional factors in the production of somatic disturbances is dealt with at some length.

The second part deals with emotional factors in different diseases. Chapters are devoted to the study of duodenal ulceration, bronchial asthma and cardio-vascular disease; diseases of the skin, metabolic and endocrine disturbances and rheumatoid arthritis are described.

These chapters are full of interest but somewhat curtailed. The book itself is restricted to 270 pages of text, which is hardly sufficient having regard to the wide variety of diseases which are described and the enormous amount of research involved. An attempt has been made to compensate for this lack of detail with a really good bibliography which invites further study.

Altogether we welcome this book as an outstanding contribution to the better understanding of disease. Every doctor should read it, especially those who regard the management of psychogenic factors in somatic disease as the art of medicine and put their trust in the passage of time to acquire proficiency in the art. Dr. Alexander has contributed to the advance of the scientific study of disease.

Clinical Genetics. Edited by Arnold Sorsby; 1953. London: Butterworth and Company (Publishers), Limited. Sydney: Butterworth and Company (Australia), Limited. 10" × 7", pp. 614, with 311 illustrations. Price: 123s. 6d.

THE application of mendelian genetics to man in health and disease is a product of the last two or three decades. In 1902 Sir Archibald Garrod recognized the familial occurrence of alkaptonuria and attributed it to a single recessive mendelian factor, a hypothesis which was afterwards abundantly proved. But such successful enlistment of theory was supposed to apply only to anomalies and

uncommon disorders, and it was not until in the last twenty years or so that the whole realm of deformity, physical and metabolic aberrancies and disease, both endogenous and exogenous, was explored by the new implement of genetic theory. The book "Clinical Genetics" by Arnold Sorsby represents an attempt to present the most recent discoveries in this domain to the medical reader. There are twenty-nine chapters and these have been entrusted to a team of widely selected experts; six of them are citizens of the United States of America, four are from Denmark, two each from Sweden and Switzerland, and one from Australia. The book covers an enormous range of investigation, and the ordinary medical reader, not conversant with the immense detail here revealed, may well gasp with astonishment at the number of syndromes each associated with the name of the original finder, names of which he is in many cases ignorant. "The present volume assumes that the reader is acquainted with the elements of genetics" is stated in the preface, and this is very true, for indeed there are expositions which need more than an elementary knowledge of genetics if they are to be comprehended. The first ten chapters are devoted to theoretical considerations, the remaining nineteen to a systematic clinical survey of each organ of the body. The subject is one which is being actively pursued at the present time, and the possibility of any book encompassing the most recent findings is not to be expected. In view of the mass of important and useful matter here offered it may seem hardly fair to be critical, but there are a few matters which a second edition might include. In the chapter on the alimentary canal there is no mention of hernia, and there is evidence that umbilical hernia in the female often shows hereditary features; imperforate anus is dismissed with a mere assertion of possibility, but every breeder of pigs knows how common this condition is and changes his boar when it occurs. Indeed it may be said that help from the veterinary side might be enlisted—for example, the well-known short teats of the heifer being transmitted through the bull. There is no mention of sexual aberrancies like homosexuality, and very little of racial proclivity. At the present time and as a reaction against Hitlerism, it is fashionable to declare that race does not exist! The team has been well chosen and the editing is restrained and never too obvious. A broad sanity characterizes the treatment of each of the many topics handled.

Medical Electronics. By G. E. Donovan, M.D., M.Sc., D.P.H.; 1953. London: Butterworth and Company (Publishers), Limited. Sydney: Butterworth and Company (Australia), Limited. 9" × 6", pp. 224, with 37 illustrations, one in colour. Price: 43s. 6d.

THE author of this book is not satisfied with the definition of electronics usually given, namely "the branch of science and technology which relates to the conduction of electricity through gases and *in vacuo*", so he gives his own: "That branch of science which describes the properties and control of electrons and other elementary particles which, in correlation with energy, constitute matter." He quotes with approval the statement made by Berkley in 1950: "In nearly twenty years of oscillography the Du Mont Laboratories has [*sic*] yet to find a phenomenon which is incapable of conversion into a suitable electrical signal." Actually the book is a survey of the application of the most recent techniques in physical science to the investigation of the human body in health and disease and with occasional reference to therapeutics. It is not a book for the specialist in any of the many branches described, but it does give a brief, if sometimes sketchy, but always lucid and accurate, description of each of the 33 very recent and useful physical procedures now applied to the human body. Naturally isotopes and Geiger counters, electron microscopes, oscillographs, electroencephalographs, cybernetics and the like are dealt with and are luminously presented.

Disease and its Conquest. Edited by G. T. Hollis, Hon. M.A. (Oxon.), with a foreword by Maurice Davidson, M.A., M.D., B.Ch. (Oxon.), F.R.C.P. (Lond.); 1953. London, New York and Toronto: Geoffrey Cumberlege, Oxford University Press. 7½" × 5", pp. 172. Price: 15s. 9d.

G. T. HOLLIS, the editor of Oxford Medical Publications, has made a successful attempt to present to the educated lay reader a broad picture of medicine.

The subjects discussed are chosen so as to represent the various classifications of disease as they affect each system of the body. Brief glimpses are given of the historical background, the scientific basis and the clinical and public health superstructure, a complete, if necessarily rather vague, outline of medical science being thus revealed.

Mr. Hollis makes no attempt to advise on the management of an illness. Indeed he would obviously be horrified if such a thought were aroused by this book. However, he devotes considerable space to descriptions of therapy, which show man's conquest of the enemies of his body. In this respect, the work suffers a not uncommon fate in these days of rapid scientific advance. Several references in the short time since publication have become obsolete.

The urge to reveal the mysteries of medicine appears to be widespread and irresistible, if one is to judge by the spate of popular literature on this aspect of human endeavour. While the ultimate value of such information may be argued, it is of interest to find an accurate presentation with a high ethical and literary standard. It is well worth reading by that group of workers called by our colleagues across the Pacific "para-medical personnel", including, of course, the doctor's wife.

A Text-Book of Bacteriology. By R. W. Fairbrother, M.D., D.Sc. (Man.), F.R.C.P. (London); Seventh Edition; 1953. London: William Heinemann (Medical Books), Limited. 8¼" × 6", pp. 500, with eight plates and 14 text figures. Price: 20s.

IT is always a pleasure to read a new edition of a text-book which has established itself as a firm favourite among those interested in the subject dealt with, and this is certainly true of the seventh edition of "A Textbook of Bacteriology" by R. W. Fairbrother.

Some aspects of bacteriology have become so highly specialized that the average clinical pathologist has difficulty in keeping abreast of recent developments, but the author of this text-book has succesfully presented his subject in simple language with the importance of the close association of medicine and bacteriology always stressed.

In view of this aspect of the subject the chapter on chemotherapy, which has been brought up to date in this edition, is particularly useful.

The book is again well printed and even with the additional material now included remains of convenient size. It is full of interest and practical information for students and clinicians as well as for the more highly qualified laboratory worker.

Therapeutics in Internal Medicine. By eighty-four authorities, edited by Franklin A. Kyser, M.D., F.A.C.P.; Second Edition; 1953. New York: Paul B. Hoeber, Incorporated. 10½" × 7½", pp. 852. Price: $15.00.

IN this book, the contributions of a large group of experts are integrated into a well-balanced and comprehensive volume on medical therapeutics. A combined ætiological, systematic and physiological approach is followed which adequately covers the subject. A good list of references, not confined to American literature, is given at the end of most sections. There are useful chapters on skin disease, fluid and electrolyte disturbances and treatment of common major symptoms. Some very useful diets are included in the appendix.

Individual subjects are in general well covered. Some of the sections are brief, but in almost all the case has been adequately stated and all accepted lines of treatment have been mentioned in sufficient detail. This brevity is commendable in a difficult subject and has enabled a wide field to be covered in a reasonably compact volume. With few exceptions, the emphasis is correctly placed, and discussions on the more simple, useful and easily applied methods of treatment lead up to consideration of more complicated therapy.

The production of this book is excellent. The type is set out in double columns. The volume is of handy size. The index is comprehensive, and most subjects can be found easily. This book is as up to date as is possible in a work of this nature and it attains a high standard in its particular field.

The Expectant Mother: A Practical Handbook of Advice to the Expectant Mother and to the Newly Married. Written by a group of doctors and published under the auspices of the New Zealand Obstetrical and Gynæcological Society, with a foreword by Sir J. Bernard Dawson, K.B.E., Emeritus Professor of Obstetrics and Gynæcology, University of Otago; 1953. Christchurch: Whitcombe and Tombs, Limited. 7¼" × 5", pp. 132. Price: 6s. 6d.

THIS handbook for expectant mothers, published under the auspices of the New Zealand Obstetrical and Gynæcological Society, deserves great praise for its succinct and reliable advice on the main obstetrical problems and the advice to the newly married.

The individual chapters are well and clearly presented, and give the mother a proper understanding of the reasons

for seeking medical supervision early, of the necessity for regular attendance and of the importance of her full cooperation with the directions of her medical adviser.

There are, however, inevitably in such a first edition, innumerable repetitions of advice—for example, Chapter 12 on toxæmias of pregnancy, an excellent chapter, is followed immediately by information concerning toxæmia under the heading "Danger Signals". Statements on the liability to hæmorrhage, personal cleanliness and pain also come under this latter heading, as well as in other sections of the book.

The inclusion of advice to newly married and of the explanatory statement on the post-natal period is to be specially commended; without this knowledge many married couples may suffer unnecessary stress, hardship and even permanent emotional or physical damage.

Advice concerning physiotherapy and exercises during pregnancy is neither well placed nor in good sequence. The mother is told in one place to play games in moderation and to continue seabathing, in another to avoid golf, tennis and swimming. She is told that backache is due to faulty posture or to lax or weak abdominal muscles and advised that low-heeled shoes and a supporting belt or corset should be worn. Mothers would be more usefully advised if it were made clear to them that ante-natal exercises, which can be readily learned by any mother, will prevent backache of muscular and postural origin. There should be more emphasis on the consistent practice of relaxation throughout pregnancy and the part the mother can play in cooperating during her confinement.

Comments on weight gain and restriction of salt intake should be associated with the section on nutrition. The information on the constituents of a good diet are efficient and explanatory, but brief advice on the way to use the actual foodstuffs—for example, daily intake, menus and hints on the many ways of using milk—would be helpful. Mothers should also be warned against the use of antacid powders and tablets; whereas they are, on the contrary, advised to take these for the relief of heartburn.

The information on the onset of labour and pain relief in labour is a most valuable contribution to the mother's peace of mind and her calm understanding of the procedure for her at this time.

The guidance on the control of toxæmia by early detection of signs and symptoms is very well presented, but the information on the termination of pregnancy is not simple enough for the mother; it would be better approached by emphasis on the interests of mother and child first and by an explanation of termination in less technical phrasing. The possibility of recurrence of toxæmia in non-hypertensive mothers is over-emphasized and might lead to unwarranted anxiety.

The objective of the Society in inspiring confidence, giving reliable advice and aiding the mother to anticipate a normal healthy pregnancy and to understand the main complications which may arise and their control, has been fully achieved. This book certainly is an important contribution to the securing of the best care and attention to the child-bearing women of New Zealand.

Peptic Ulcer. By C. F. Illingworth, C.B.E., M.D., Ch.M., F.R.C.S.E., F.R.F.P.S. (Glas.); 1953. Edinburgh and London: E. and S. Livingstone, Limited. 9¾" × 7", pp. 296, with many illustrations, some in colour. Price: 42s., postage abroad 1s. 3d.

THE fascinating puzzle of peptic ulcer has resulted in many monographs in recent years. The latest comes from the Department of Surgery, University of Glasgow, where the disease has been studied intensely for many years. Professor C. F. W. Illingworth has collected the results of these investigations and has incorporated them with other material mainly from the United Kingdom, but also from the United States of America and Scandinavia, in his book "Peptic Ulcer".

The author is well qualified to write such a book and he preserves a nice sense of balance in his discussions, giving both points of view on contentious points and summing up logically. In the discussions on perforation and bleeding from peptic ulceration the reader is left in no doubt about management and indications for surgery.

Most aspects of the subject are fully discussed, including the experimental production of peptic ulcer in animals and its etiology in man, but the book is essentially practical and generally conservative.

Emphasis is laid on the changing incidence and characteristics of the malady. The striking increase in duodenal ulceration in man in recent years, the mounting incidence of perforating ulcer in men during the war years, the virtual disappearance of perforating gastric ulcer and bleeding acute ulcers in women pose as yet unexplained facts.

Throughout the book opinion based on careful statistical analysis precedes instruction on management. Based on such evidence the medical management of the disease is disappointing in the long run, the rate of recurrence reaching 75% in five years in one follow-up series of 337 patients. However, the author considers it rare to advise operation on ulcers of less than five years' duration. Partial gastrectomy is recommended as the procedure of election when surgery is required, but he suggests that careful consideration be given to gastro-enterostomy in elderly men and in women with duodenal ulceration. He also appreciates that the present clamour for partial gastrectomy may have to be modified in time as it is as yet too early to assess the results fully. Post-operative complications, including the post-gastrectomy syndromes, are discussed.

The monograph is excellently presented in clear type, with splendid, neat graphs and diagrams and occasional coloured photographs of gastroscopic appearances. There is a special chapter on the disease in women and children, and for completeness mention is made of œsophageal ulcer and the ulcer in Meckel's diverticulum.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"The Management of Pain: With Special Emphasis on the Use of Analgesic Block in Diagnosis, Prognosis, and Therapy", by John J. Bonica, M.D.; 1953. Philadelphia: Lea and Febiger; Sydney: Angus and Robertson Limited. 10" × 7¼", pp. 1534, with 785 illustrations. Price: £10 15s.

The purpose of the book is to present a concise but complete discussion on the fundamental aspects of pain, the conditions in which it constitutes a major problem and the methods employed in its management, with special reference to the use of analgesic block.

"Evolution as a Process", edited by Julian Huxley, F.R.S., A. C. Hardy, F.R.S., and E. B. Ford, F.R.S.; 1954. London: George Allen and Unwin Limited. 9¼" × 6¼", pp. 394, with 30 text-figures. Price: 25s.

A series of essays by nineteen different contributors.

"The School and the Site: A Historical Memoir to Celebrate the Twenty-fifth Anniversary of the School", by Catherine M. Clark, M.A., and James M. Mackintosh, M.D.; 1954. London: H. K. Lewis and Company Limited. 10" × 7½", pp. 116, with 44 illustrations. Price: 21s.

This is a publication of the London School of Hygiene and Tropical Medicine.

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This is Volume XXXII of the "Research Publications" of the Association for Research in Nervous and Mental Disease.

"New Dimensions of Deep Analysis: A Study of Telepathy in Interpersonal Relationships", by Jan Ehrenwald, M.D.; 1954. London: George Allen and Unwin Limited. 8¼" × 5¼", pp. 316, with 13 text-figures. Price: 25s.

The author's study "is concerned with the description and psychodynamic evaluation of a new group of observations for which no provisions have been made in the main building of modern dynamic psychiatry. . . ."

"Aids to Surgical Diagnosis", by Cecil Wakeley, Bt., K.B.E., C.B., LL.D., M.Ch., D.Sc., F.R.C.S., F.R.S.E., F.R.S.A., F.A.C.S., F.R.A.C.S.; Third Edition; 1954. London: Baillière, Tindall and Cox. 6¼" × 4", pp. 260, with 15 text-figures. Price: 6s. 6d.

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The Medical Journal of Australia

SATURDAY, JUNE 19, 1954.

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AN OPHTHALMIC SURVEY IN WESTERN AUSTRALIA.

OPHTHALMOLOGISTS who attended the annual meeting of the Ophthalmological Society of Australia (British Medical Association), which was held at Adelaide in October, 1953, had the privilege of hearing from Professor Ida Mann a report of an ophthalmic survey made by her in the Kimberley Division of Western Australia. Her address was illustrated by an attractive series of coloured lantern slides, and the facts were presented in such a way that those present could not fail to be impressed with the significance of what had been done. The Government of Western Australia has now issued a report of this survey, and it is our intention to bring it to the notice of medical practitioners throughout the Commonwealth.

The history of the undertaking is interesting. In February, 1953, an offer was made by the Victorian Section of the Flying Doctor Service of Australia to defray the expenses of the air travel which would be involved in the carrying out of an ophthalmic survey of the Kimberley district of the northern part of Western Australia. The Victorian Section of the Flying Doctor Service it was which established and maintains the base of the Flying Doctor Service at Wyndham, Western Australia, and a sub-branch at Derby. The undertaking of a survey of this kind had been one of the objectives of the late John Flynn, who founded the Flying Doctor Service, and the need for such surveys had been endorsed by the Prevention of Blindness Committee of the Ophthalmological Society of Australia at its first meeting in 1939, but no survey had been made before Flynn's death in 1951. It is to the credit of the Public Health Department of Western Australia that the present survey has been undertaken. The Commissioner of Health for Western Australia, Dr. Linley Henzell, who was anxious that investigations of the kind should be carried out, realized that many of the places which had to be visited were not accessible by air, and the Department undertook, therefore, to supply a truck, together with a personnel of three—Mr. Eric Britten, one of the health inspectors of the Department, Dr. Mercy Sadka, who was to act as medical assistant and would deal with any problems of general disease that might arise, and Professor Ida Mann, the ophthalmic consultant to the Department. The Department contributed the full-time salaries of the personnel, the expenses of overland travel and a large part of the medical and general equipment carried. The expenses of the four thousand miles travelled by air were borne by the Australian Inland Mission. In addition, the Australian Iron and Steel Corporation arranged for a passage on their launch for the two hundred miles to and from Cockatoo Islands; the Wotjulum Mission organized transport by its lugger.

The region known as the Kimberleys is a vast area of cattle and sheep stations, many of them a million acres in extent, stretching from a boundary of the Northern Territory to the coast between Wyndham and Broome. It forms a rough rectangle, of which the shorter, north-east, side is approximately three hundred miles long and the east-west side four hundred miles. The procedure adopted was really quite simple. It was realized that as many of the population as possible should be examined, whether they were complaining of eye trouble or not. It was important to announce that persons of all races, beginning with the white population, were to be examined. This was done, so that no impression would be created that what was taking place was "just another investigation into the habits of or paternal attempt at beneficence towards the aboriginal population alone". It was made clear in every place that eye diseases could affect persons of all races indiscriminately, and by this means full cooperation was obtained. Most of the townships, hospitals, missions and stations were advised by letter of the intended survey before the members of the expedition started. The district medical officers in each township made the final arrangements among schools, orphanages and so on. Had more time been available, the expedition might have been extended for another month and many more places might have been visited. Requests were received from stations which could not be visited. In all, 2866 persons were examined in the main survey. A further 327 were examined in a pilot survey on the return journey from Derby, but an account of these examinations is not included in the report. Of the 2866 persons examined, 1502 were male and 1364 were female. The white persons examined numbered 679; of these, 442 were males and 237 females. The aborigines examined numbered 1680; 820 of these were males and 860 females. The coloured persons examined (all those who were not white or full-blooded aborigines) numbered 507; 240 of these were males and 267 females. It became apparent in the first place that under the available conditions it would not be possible to conduct a detailed ophthalmic examination in every case. Many examinations were conducted in the open air, in full sunlight, in duststorms, on the seashore, sometimes in the evening by the light of hurricane lamps and electric torches, and sometimes hurriedly in roadside camps. At times the conditions were good, as in district

and Australian Inland Mission hospitals, in State schools and on some stations. The procedure is set out in detail. (i) As far as possible, everyone, whether complaining of eye trouble or not, on any station or mission station visited was examined. This was not possible in townships, but in most places the numbers seen were very close to the estimated total numbers. (ii) Wherever possible, examinations were conducted in daylight in the open air, close to a shed or building which could be used as a dark-room when this was absolutely necessary. (iii) An index card was filled in for each person seen. (iv) The name, age and race of the patient were ascertained as accurately as possible. With white persons this was easy. With coloured persons, the name and age were easy to obtain, but the racial mixture was often difficult to disentangle, since white, Asiatic and aboriginal crosses were common, especially near the sea. This was the reason for the division of the persons examined into the three groups, white, full-blooded aboriginal and coloured. It was not always easy to ascertain the name of an aboriginal, but some name by which he could be identified later on was obtained. It is amusing to note that in many cases a nickname was used or a name commemorating some happening at the time of birth. Thus one found Aeroplane, Monday, Wireless, Winston, Banjo, Masher, Jingle, Starlight, Moonlight, Daylight, Grasshopper and an occasional Bull Camel. Ten-year age groups were used in classification. (v) Examination of the lids and adnexa was done in daylight. It was found to be essential to evert the upper lid in every case. No opposition to the examination was ever encountered, except from infants and very young children. (vi) Examination of the cornea and iris was made in daylight, and sometimes when in doubt by focal illumination in the shade or in a shed or building. (vii) Examination of the lens was done with an electric ophthalmoscope in a dim light, only where a suspicion of cataract was aroused by the symptoms or by the appearance in daylight. (viii) Fundus examination was carried out only on white persons or on aborigines when the history suggested an abnormality. Wholesale fundus examination was not possible in a survey such as was being made. No reference in the report is therefore made to conditions of the retina, choroid or optic disk—the report deals with the anterior segment of the eye only. (ix) Examination of visual acuity and of colour vision was made in a certain number of cases, but it was found that most aborigines were illiterate and standard conditions of testing were not available. (x) Whenever possible, some inquiry was made into the general health and conditions of life, diet, hygiene and anything else of interest. The report is mainly concerned with the existence of trachoma, and it is important to note that ignorance of ophthalmology was widespread and that the diagnosis of trachoma had not been previously tackled in a systematic way in any place that was visited. It is pointed out that in a recent brochure issued by the World Health Organization, Australia was instanced as one of the few places which are free of trachoma. This is no doubt due to the fact that although trachoma is a notifiable disease in Western Australia, only one of the 26 cases in white persons encountered appeared to have been notified, and none of the 1173 aborigines and coloured persons who were infected had been the subject of notification. A few decades ago, trachoma was extremely widespread in the west of Queensland, but we understand that the incidence has now become very much reduced.

Professor Mann makes short reference to the types of eye and normal variations in full-blooded aborigines, in white persons and in coloured persons. Limitations of space make it necessary to refer to only one or two of the observations in regard to the eye of the full-blooded aboriginal. On two occasions Professor Mann was able to examine the eye of an aboriginal baby within an hour of birth. Labour had been easy and uneventful. Numerous flat hæmorrhages were found around the optic disk and over the posterior poles. Many of them were streaked in the direction of the nerve fibres and they were undoubtedly in the nerve fibre layer. Others were more oval and discrete in appearance, and were probably deep to the nerve fibre layer. The presence of neonatal retinal hæmorrhages has been described in England and the United States of America. They have sometimes been thought to be due to prolonged labour and the use of forceps. They always clear up in a few days and have never been proved to have any ill effects. Professor Mann observes that their presence after uncomplicated labour in a *multipara* of a healthy and uncivilized race is of great interest, and she seeks to show that these hæmorrhages should be regarded as normal. In the adult aboriginal eye, types of pigmentation of the conjunctiva are described. The first is a slate-coloured, patchy coloration due to chromatophores in the deeper tissues around the emergent scleral veins. The second type comprised chocolate and golden-brown granular pigment just under the epithelium. This pigment appeared to develop slowly throughout life and to become more obvious in the line of the palpebral aperture than in the bulbar conjunctiva covered by the lids. It might occasionally be aggregated into dense black, so-called melanomata, and Professor Mann thinks that it is uncertain whether they should be regarded as normal. The third type of pigment is the pigment ring which surrounds the cornea at the limbus and slightly overlaps it. It is of interest because of its local migration onto the cornea after injury or ulcer near the limbus; it often remains permanently in the spot to which it has migrated. It does not migrate in trachomatous pannus unless it is complicated by ulceration.

A section is devoted to a summary of the findings. The commonest and most important disease from the medical and sociological point of view was trachoma. It was present in 1199 persons, or 41·84% of the total 2866 persons examined in the main survey. Next to trachoma in importance was injury causing corneal scars and often monocular blindness. Of the 2866 persons examined, 111 were blind in one eye, and an additional 149 were blind in both eyes. The commonest cause of monocular blindness was injury, which accounted for 61 of the cases; strabismus was next with 18 cases and trachoma third with 17. Of the 149 cases in which binocular blindness was recorded, trachoma was the cause in 96, cataract in 13 and trachoma and cataract in 11. The percentage of binocular blindness in the total number of persons examined was 5·19. This incidence is high. In fully settled and civilized countries the incidence is approximately 0·15%. In England the chief cause of binocular blindness is cataract. Here, cataract comes second on the

list, with 13 cases only. In England myopic degeneration is responsible for 10% of all blindness, while not a single case of myopic degeneration was discovered in the Kimberley survey. It is pointed out that these differences are of interest, because it is clear that if trachoma was eliminated, the incidence of binocular blindness in the Kimberleys would drop to 1·88%, which, although higher than it need be, is yet reasonable in an area which is entirely devoid of ophthalmic services. In other words, the eyes of the population of the Kimberleys are healthy apart from trachoma.

Professor Mann's observations on trachoma are the most important of the whole report. She insists that it must first of all be realized that trachoma is a lifelong disease, running the gamut of several stages and ending in a variety of ways. She has adopted the classical description of A. F. MacCallan, who divided the course of the disease into four stages. MacCallan's first stage follows immediately after infection. The semitransparent, whitish and almost non-vascular follicles or granulations appear first on the tarsal plate. This stage is highly infectious, and in the Kimberleys was found almost invariably in children. Pannus, or corneal vascularization, arising from infection of the corneal epithelium with the virus of trachoma, begins in stage one. In every case in which Professor Mann looked for it carefully, it was present in stage one, so its advent is probably almost simultaneous with conjunctival involvement. Stage two of trachoma is the stage of excessive follicle formation and beginning discharge, which is also highly infective. Stage one is practically symptomless, but in stage two discomfort is present with discharge and œdema of the lids leading to slight ptosis; the patient has a rather sleepy look. The second stage of trachoma passes over into the third stage by the formation of scar tissue. This third stage is the stage of spontaneous cure. The cure may be excellent with preservation of good sight, the pannus never having reached the centre of the cornea. On the other hand, the cure may be only moderately good with corneal opacity, but with preservation of sight. It may also be a "cure" which ends in dryness from distortion of the lids by bands of scar tissue so that a condition of entropion follows. Stage four is the stage of complete cicatrization and is non-infective as far as trachoma is concerned, but by the time stage four has been reached there have often occurred secondary infection, dacryocystitis, blepharitis, keratitis and sometimes necrotic changes and perforated ulcers of the cornea. For clinical purposes, Professor Mann used the following classifications: (i) *Acute trachoma. This* includes MacCallan's stages one, two and early three, and is infectious. (ii) *Trachoma healed and with good sight.* This includes MacCallan's stage three and stage four, where there have been *no secondary infections and no* complications. (iii) Trachoma healed with impaired sight. *This is MacCallan's stage four, where there has been* a fair amount of secondary infection with some complications. (iv) *Blind from trachoma. This is also MacCallan's* stage four with severe corneal complications in which vision is *almost permanently completely lost.* In order that the stage of cure may be obtained, it is necessary that a *diagnosis should be made early* during the active stage and that prompt treatment should be carried out. *Professor Mann points out that recent work from the* Lebanon, where an intensive campaign against trachoma is in progress, suggests that the condition is a more generalized disease than has been suspected. Present-day opinion favours a virus as the cause of trachoma, and the Prowazek-Halberstaedter bodies seen in the epithelial cells of the conjunctiva are thought by Thygeson and other authorities to be the actual inclusions of living virus particles. Such bodies have been found in other mucous membranes in a high percentage of trachoma patients. This means that trachoma is the result of a general infection. This concept of the disease also fits in, as Professor Mann remarks, with the clinical observation that sulphonamide preparations are more beneficial in trachoma if they are given by mouth than if they are applied directly to the eye. Professor Mann points out that there is no doubt that the disease can easily be conveyed by direct contact of the ocular discharge with the conjunctiva of a healthy eye. Whether this is the common means of infection or whether an insect is more important is not known with certainty, but it is undoubtedly true that conditions of dirt, poverty, squalor and personal disregard of hygiene are always accompanied by a high trachoma rate, and that as a depressed population betters itself, the disease tends to disappear. It is possible that lice may act as carriers, and if the view is accepted that the trachoma virus can gain an entry by way of any mucous membrane, the possibilities become legion in conditions such as obtain in a large part of Australia. In addition to these opinions, Professor Mann sets out others which deal with the problem of how trachoma arrived in Australia. She has also made a geographical analysis of the disease and is unable to come to any firm conclusion from it. What has contributed to the spread of trachoma among the native population is the fact that natives are forced economically to reside in camps attached to the stations. Since the hunting grounds have become cattle stations, the nomadic life of the aboriginal is no longer possible, and they have become dependent on the stations for their rations. The aborigines are forced to camp on one site continuously, and since their ideas of hygiene are rudimentary, the site becomes unbelievably foul in a very short time. In the treatment of trachoma the sulphonamide drugs, when administered orally, have a curative effect, and aureomycin and terramycin applied locally to the eye are also beneficial. Professor Mann describes the treatment which she has used together with the dosage for adults and children, and she also describes the aureomycin ointment and the way in which it may be used. *The effect* of treatment is shown in the fact that when the patients at the leprosarium were examined, *164 of 265 coloured full*-blooded aborigines had signs of trachoma, but in no single instance was the disease in an *infectious stage. (Sulphon*amide drugs are used in the treatment of leprosy.) There were 23 coloured patients in *addition to the 164, and of* the total of 172 no less than 140 had excellent sight, eight had impaired vision, *the impairment being present when* they arrived at the leprosarium, and 24 were blind. The leprosarium, in Professor *Mann's opinion, is a very* efficient centre for the carrying out of further observation of the effect of *the systemic use of sulphonamide drugs* in trachoma.

So much space has been taken up *with the description* of trachoma and its treatment that all reference to other

conditions mentioned in the report must be omitted. All that remains is to refer to Professor Mann's recommendations, which include a campaign for the treatment of eye diseases in remote parts of Australia. It is important that every case of active trachoma should be discovered and that adequate treatment should be given to every patient. Not only this, but the patients should be followed up for a period of approximately two years to ensure that there is no relapse. In addition to a follow-up campaign, something must be done to raise the standard of living of these persons—aborigines, coloured persons and whites—who are affected. It is clear that the work can be done. The Government of Western Australia, through its Commissioner for Health, has shown vision and initiative and is much to be commended by every Australian student of disease. It is to be hoped that Professor Mann's survey will be continued in other parts of Western Australia, and that one result of her work will be the appointment of an ophthalmic surgeon who shall undertake the training for, and carrying out of, a campaign to discover trachomatous infection wherever it exists and to initiate steps which will result in its effective elimination.

Current Comment.

SALICYLATES AND THE PRODUCTION OF ADRENOCORTICAL STEROIDS.

THE mode of action of salicylates remains a mystery despite numerous investigations and numerous theories. A fairly recent suggestion has been that salicylates bring about an increase in the secretion of adrenocortical steroids, either by direct action on the adrenal glands, or by indirect action through the anterior lobe of the pituitary gland. This theory is attractive and in some respects plausible, and it has been supported by the reports of certain investigators that the therapeutic administration of acetylsalicylic acid caused an increased urinary excretion of reducing steroids, this increase corresponding with clinical improvement. Experimentally, it has been found that the intraperitoneal injection of salicylates into rats reduces the ascorbic acid content of the adrenal glands, an effect which is generally accepted as indicating increased activity of the pituitary-adrenal system, and it has also been claimed that rats treated in this way have an increased corticotrophin content of their blood. However, the reliability or at least the significance of these results has been seriously challenged, and two recent reports[1] seem to leave the matter in little doubt. M. J. H. Smith, C. H. Gray and J. B. Lunnon have investigated the urinary excretion of adrenocortical steroids in patients receiving salicylates by a paper chromatographic method which enables separate estimations to be made of compound E, compound F and tetrahydrocortisone. The subjects were three women suffering from rheumatic fever, a fourth woman suffering from rheumatoid arthritis, and a man suffering from rheumatoid arthritis. In each case, the patient was treated with four-hourly doses of sodium salicylate, a total of 150 to 200 grains daily being given. With the first three women patients, it was found that when the salicylates were being given, the urinary excretion of adrenocortical steroids did not exceed the normal range; and when administration of the salicylates was stopped, there was no decrease in the excretion of steroids. The man and the woman with rheumatoid arthritis were given corticotrophin subsequently to their treatment with salicylates. It was found that the administration of salicylates caused no increase in the urinary excretion of adrenocortical steroids, but the subsequent administration of corticotrophin caused a considerable increase. Discussing the conflict between their results and those of earlier investigators, Smith, Gray and Lunnon suggest that in the earlier investigation the salicylates might have caused an increased urinary excretion of some neutral lipoid-soluble steroid which was not estimated in their method, or alternatively, that the metabolites of salicylates might have been measured.

The other report concerns an investigation by R. I. S. Bayliss and A. W. Steinbeck in which a more direct approach to the problem was made by measuring the plasma level of circulating adrenocortical steroids before and after salicylate therapy. Seven patients were given prolonged treatment with acetylsalicylic acid in therapeutic doses, and four other patients were given a single large dose of sodium salicylate in water. In no case was there a significant increase in the level of circulating adrenocortical hormones. Bayliss and Steinbeck remark that if there was any increase in the secretion of these hormones, the steroids must have been either more rapidly utilized in the tissues or more rapidly excreted from the body, since the level in the plasma remained unchanged. They point out, in commenting on the fact that intraperitoneal injection of salicylates in certain dosage reduces the ascorbic acid content of the rats' adrenal gland, that the amount of salicylate given in experiments with significant results corresponds to a dosage outside the usual therapeutic range for human subjects. They agree that *it may well be that doses of salicylate larger than those* which they gave in their investigation will stimulate the pituitary-adrenal system, and that toxic doses in man will be found to increase the level of circulating adrenocortical hormones. That is the response to any non-specific noxious agent; but from their data there is no evidence that salicylates in sufficient dosage to cause mild or moderately severe salicylism induce a significant degree of pituitary-adrenal stimulation comparable to that found after the administration of corticotrophin. Thus, the results of these two investigations would seem to counteract effectively the hypothesis that the therapeutic activity of salicylates in the treatment of rheumatic diseases depends on the intermediary production of corticotrophin.

[1] *Lancet*, May 15, 1954.

COMPOSTING AND DISPOSAL OF WASTE.

THE story is told of a methodical householder who declared that he had little need for the official garbage collecting service—indeed, there must have been little left to be carted away when, as he put it, everything compostable had been composted, everything comestible had been comested, and everything combustible had been combusted. As a result, his garden waxed fertile from the compost and his ducks waxed fat from the scraps, but whether his neighbours waxed fierce at being smoked out is not related. No doubt, being a methodical householder, he attended to that. However, other householders are not all so self-reliant, and public authorities are left with the task of disposing of large quantities of waste material. Commonly used methods of effecting this have a number of advantages and disadvantages, but, as C. Golueke and H. Gotaas[1] have pointed out, they are generally unsatisfactory from the standpoint of health; flies, mosquitoes, rodents, odours and smoke are associated with dumps and controlled tipping, and air pollution tends to accompany incineration. In the light of this, Golueke and Gotaas draw attention to the value of composting, which they define as the stabilization of organic matter by biological decomposition producing a humus useful to agricultural soils. They state that it has been practised in a simple form in Asia for centuries and in a more highly organized manner in Europe during the past several decades. Every home gardener knows of its value on a small scale. Golueke and Gotaas indicate that investigation of the composting of garbage refuse, sewage, sludge and other organic wastes as a disposal method shows that, in addition to the

[1] *Am. J. Pub. Health*, March, 1954.

reclamation of some of the materials for use as a soil conditioner and fertilizer, it is also found that sanitary problems such as those associated with flies, rodents and bacterial odour can be reduced if this method of refuse disposal is employed. They describe the history and methods of composting in various parts of the world, and go on to refer to a simple and reliable composting procedure for municipal refuse which has been developed by the Sanitary Engineering Research Laboratory of the University of California. Important steps in the process are grinding, stacking, aeration by turning and regrinding. Compost is produced by aerobic thermophilic micro-organisms in ten to twenty days. No inoculums are required. Temperatures in the 70° to 75° C. range persist for from four to six days, during which, with proper turning of material, pathogens and insect eggs, larvæ and pupæ are destroyed. The final product has been found to have many characteristics beneficial both to the soil and to growing vegetation.

EXFOLIATIVE CYTOLOGY AND THE DIAGNOSIS OF MALIGNANT DISEASE.

THE examination of specimens of secretions and excretions obtained from various orifices of the body has provided a valuable additional tool in the diagnosis of malignant disease. Dignified by the term "exfoliative cytology", the study of carcinomatous cells in such material frequently solves problems of differential diagnosis even if the idealistic objective of "early" diagnosis is not always achieved. A recent addition to the extensive literature on the subject is provided by R. C. Jennings and K. M. Shaw,[1] who review 966 cases of pulmonary disease at the London Chest Hospital in which sputum examinations were made. Using a modified wet-film-methylene-blue stain, they examined white streaks and blood-stained portions of sputum, or failing these, purulent, mucopurulent or mucoid portions. Three hundred and ninety-five of 403 cases of carcinoma of the bronchus were studied by the technique described, and positive results were obtained in 60·7%, the figure being raised to over 80% if cases in which the six examinations considered necessary for a negative result were excluded. Of special interest is the fact that in 42 cases of round peripheral tumours, a cytological diagnosis was possible in a similar percentage; further, a cytological diagnosis was made in the same proportion of cases from which a bronchial biopsy could be taken as from those in which it could not. These two observations indicate that the site of the growth does not influence the accuracy of the method, a fact which is of considerable importance to the clinician. Six false-positive results in 563 non-malignant cases were found, in four of which the error was associated with squamous cells in the specimen as a result of squamous cell metaplasia or recent bronchoscopy. Jennings and Shaw present case reports illustrating the value of the investigation to the surgeon (who may feel, at exploratory thoracotomy, a firm mass "which could equally well be a carcinoma, lung abscess, tuberculous focus or benign tumour", and who has to decide immediately on the operative procedure) and to the physician, in distinguishing, in certain types of case, carcinoma from pulmonary tuberculosis, or in demonstrating the co-existence of the two.

Some aspects of the literature bearing on the exfoliative cytology of the digestive tract have been briefly but effectively reviewed by W. L. Palmer and C. E. Rubin,[2] of Chicago, and some of the general principles enumerated in their paper are worthy of restatement in the present context. They stress the need for an adequate specimen, obtained with meticulous care in several respects to avoid both "false-positive" and "false-negative" results, and the need for rapid and efficient examination. They also indicate that the great value of the technique lies in differentiating the benign lesion from the malignant one, rather than in enabling an initial diagnosis to be made in cases where collateral evidence as to diagnosis is slight or lacking. Hence, Palmer and Rubin consider that at present cases should be selected for the investigation: a more conservative Anglo-Saxon race is less likely to accept the possibility that in the future "the procedure may prove very useful in basic biologic and clinical investigation", whatever such an investigation is.

Incidentally, in Palmer and Rubin's historical introduction, which does not claim to be complete, the earliest listed paper on the diagnosis of gastro-intestinal cancer by examination of the stomach contents is that of Rosenbach in 1882, who did not perform microscopy. The earliest observation of which we are aware is that of J. T. Rudall,[3] who, in reporting the first Australian gastrotomy in 1867, noted that microscopic examination of material from the end of an œsophageal bougie, which could not be passed beyond an obstruction, failed to show evidence of malignant disease. In modern terminology, it was a "false-negative" result, as demonstrated by the autopsy specimen.

[1] Thorax, December, 1953.
[2] Am. J. Med., October, 1953.

ABORTIVE EPIDEMIC HEPATITIS.

IT is known beyond dispute that certain common epidemic diseases occur in subclinical or abortive forms. Their occurrence may be established in some cases by specific bacteriological or serological tests; in others it is inferred with reasonable confidence from attendant clinical or epidemiological features. Leif Thorling[2] has brought forward the view that there is nothing to suggest that epidemic hepatitis is exceptional in this respect, though the lack of specific tests—for general use, at least—leaves us comparatively ignorant of any abortive form. Clinically, one may differentiate two types of epidemic hepatitis—icteric and anicteric. The diagnosis is based on the clinical symptoms, in conjunction with liver function tests. Thorling points out that none of these tests is specific for epidemic hepatitis, and many of them are not even specific for inflammatory liver diseases. During epidemics, of course, diagnosis of icteric cases is not difficult; but anicteric cases may be more difficult to identify. Just the same, both these forms have certain subjective and objective features which are likely to make the diagnosis clear. The abortive form (and there is much evidence that it really exists) lacks these characteristic symptoms, and the patient may not even feel ill. If it is to be diagnosed, reliance must be placed on laboratory tests. As has been already mentioned, there are no specific laboratory tests for epidemic hepatitis, but Thorling considers that "certain combinations of chemical disturbances" are characteristic of the disease. A real difficulty is the assessment of minimal responses (reasonably to be expected and, in fact, found in Thorling's investigation) to tests in cases of presumed abortive epidemic hepatitis. Thorling considers that there is no valid objection to the diagnostic value of these minimal results; this may be so, but the question can scarcely be regarded as settled. The details of Thorling's laboratory technique need not concern us here beyond mentioning that he suggests ways by which the tests can be made more sensitive and so reveal small chemical changes in the blood. In the small group of persons in this series who were regarded as having abortive epidemic hepatitis, the subjective symptoms exhibited were "particularly insignificant and uncharacteristic and of no diagnostic value". Slight nasal catarrh was observed in three out of five cases, and there is no reason to suppose that this was due to accidental coincidence of two different diseases. This symptom, while far from diagnostic, may be of some help in the overall diagnostic procedure. The point to be stressed is that if this abortive form does occur, as seems more than likely, it will play an important part in the uncontrolled spread of infection, especially in relation to donated blood for transfusion. This fact alone makes further investigation of considerable importance.

[1] Australian Medical Journal, Volume XII, 1867, page 161.
[2] Acta med. scandinav., Vol. 148, fasc. 1, 1954.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Staphylococci and Egg-Yolk Broth.

V. G. ALDER, W. A. GILLESPIE AND G. HERDAN (*J. Path. & Bact.*, July, 1953) observed the production of opacity in egg-yolk broth by staphylococci from various sources. It was found that coagulase-negative staphylococci of human origin were all egg-yolk negative, that is, the broth did not present a curd after incubation. Most of the coagulase-positive strains were egg-yolk positive, but there were some coagulase-positive egg-yolk-negative strains amongst strains obtained from nasal cultures. The authors discuss the difference between the virulence of the organisms in deep tissues compared with their ability to produce inflammation in the skin.

Studies on Streptococci.

N. P. SHERWOOD, BARBARA RUSSELL, K. BOWMAN AND J. OTT (*J. Infect. Dis.*, November-December, 1953) have continued their work with a study of the relationship of certain virulence factors in streptococcal infections to the LD_{50} dose of streptococci. They tested strains from human disease which fell into five Lancefield groups, and assembled the results. The tests were for mouse virulence, LD_{50}, and also for virulence for the chick embryos. The production of spreading factor of hyaluronidase, fibrinolysin, the apparent generation time and the leucocidin index were estimated. The first thing of interest to emerge was that five strains avirulent in mice were all able to kill the chick embryo, showing the latter to be a more sensitive test animal. There was no correlation between virulence and the production of hyaluronidase *in vitro* or the spreading factor in rabbits, or the leucocidin index. The rapidity with which the organisms multiplied, as indicated by turbidity methods, showed that some rapidly virulent strains grew slowly, while some strains with similar LD_{50} for mouse had widely different generation times. The authors conclude that their study of 25 strains of β hæmolytic streptococci did not reveal the factor or factors resulting from the interaction of host and parasite which could be considered lethal, although they might throw light upon the dissemination and maintenance of the infectious agent in the host, and perhaps give a clue to the production of lesions in the host.

Bacteriophage Typing of Staphylococci.

J. E. BLAIR AND MIRIAM CARR (*J. Infect. Dis.*, July-August, 1953) describe the bacteriophage typing of staphylococci as a preliminary to a study of antibiotic-resistant staphylococci. They comment on the scarcity of reports of phage-typing in the United States of America and report their techniques in detail. These comprise Fisk's method for the primary isolation of phage and propagation of phage on agar plates, titration of phage, storage of supernatants of centrifuged cultures as stock phage rather than Seitz filtrates (in which the loss of titre due to filtration is considerable), and finally the phage-typing of an unknown staphylococcus by the technique of smearing a whole Petri dish of agar from a culture, drying the surface, and then "spotting" phage filtrates placed on areas defined by a grid ruled with a diamond pencil on the bottom of the plate. Strains of staphylococci are then differentiated by the pattern of lysis obtained usually with a combination of phages, although an occasional strain is lysed by a single filtrate only. Four of the phage filtrates were isolated in the authors' laboratories, 21 were received from Dr. Fisk, and 539 strains of coagulase-positive staphylococci were tested against these 25 strains; 290 were typed, 245 were not lysed by any phage in the series, and four gave equivocal results. Nine additional phages were later used for retesting 100 of the untyped strains without any further information being gained. Numerous examples are quoted of identification of the same phage type of staphylococcus from a local lesion and from the blood of the same patient. The authors discuss the use of the method in epidemiological work and foreshadow its use in clinical studies.

Chlamydospore Production in Candida Albicans.

W. J. NICKERSON AND Z. MANKOWSKI (*J. Infect. Dis.*, January-February, 1953) describe a polysaccharide medium of known composition favouring chlamydospore formation in *Candida albicans*. It was known that media rich in reducing sugars suppressed filament and chlamydospore formation, while batches of medium of vegetable origin which induced satisfactory chlamydospore formation could be prepared from plant materials. The authors used a basal salt mixture with added biotin and trypan blue, and added to it either the expensive Pfanstiehl glycogen (which did not react with Fehling's reagent) or starch precipitated from solution by half-saturation with ammonium sulphate in order to free it from reducing sugars. To the basal mixture 2% of either polysaccharide was added, and slide cultures were prepared, incubated at 25° C. and examined after four days. It was found in a comparative trial with corn meal agar that a larger proportion of Candida cultures could be induced to form chlamydospores in the polysaccharide medium.

Assay of Virus Hæmagglutinins.

S. LEVINE, T. T. PUCK AND B. P. SAGIK (*J. Exper. Med.*, December, 1953) have developed an absolute method for assay of virus hæmagglutinins. They used allantoic fluid from eggs infected with the virus of either influenza A or Newcastle disease. They tested the mean infective dose by titration of serial dilutions of the virus in batches of five eggs; they estimated the hæmagglutinin content by titration of the ability to agglutinate washed chicken red blood cells after the method of Salk, and their absolute method was the measurement of optical density in a spectrophotometer of mixtures of washed chicken red blood cells and a dilution of the virus to be tested. In the dilutions in which small numbers of virus particles are present and aggregates of only two red blood cells are likely, the area of illumination by the beam of light is likely to be stabilized with a constant number of two-unit masses leaving and entering the area within sixty to ninety minutes; and curves prepared for increasing strengths of virus show a constant parallelism in the fall and, when these figures are correlated with the results of the estimation of the number of infectious particles, an equivalence of 0·05 times the number of red blood cells per cubic centimetre of absolute particles for each hæmagglutinating unit. This also agreed fairly well with electron microscopy counts of the virus suspension made with the aid of polystyrene electron micrography.

Mechanism of Antibacterial Activity of Certain Peptides.

J. G. HIRSCH (*J. Exper. Med.*, January, 1954) has studied the mechanisms involved in the antimycobacterial activity of certain basic peptides. He found that the addition of nucleic acids lowered the activity of the peptides, and that of a series of inorganic salts three which were added in the form of sulphate antagonized the inhibitory power of the peptide; further tests established the fact that the sulphate ion was responsible. Sodium sulphate, ammonium and potassium sulphate all exhibited neutralizing capacity, but none was so effective as magnesium sulphate. It is suggested that thymus peptide suppresses growth of tubercle bacilli by interfering with the normal sulphur metabolism of these organisms. Other basic peptides such as ACTH also inhibit the growth of acid-fast bacteria, and this effect can be antagonized by sulphate ions.

Herpes Simplex Virus in Tissue Culture.

E. R. BICKERSTAFF (*J. Path. & Bact.*, October, 1953) has studied the cytopathogenic effect on tissue culture of *herpes simplex* virus. His technique was a simple one, consisting of the incubation of minced chick embryo tissue, either epithelial or fibroblastic, in four millilitres of a buffered balanced salt solution enriched with "embryo juice", half a glass coverslip being placed upright in the tube. The tubes were rotated in the roller for forty-eight hours to start the tissue growing, and then virus was introduced either from the infected mouse brain or from the infected amniotic cavity. It was found that the tissue grew well on the coverslip (this could be removed and stained for further examination) and that much alteration and degeneration of the growing cells was induced by the presence of virus. The addition of antiserum would inhibit the cytopathogenic effect and keep the tissue culture growing normally. The author suggests that this simple technique may be useful in the study of herpes encephalitis, in which a diagnosis is often uncertain.

Antimycobacterial Activity of a Peptide from Thymus.

R. J. DUBOS AND J. G. HIRSCH (*J. Exper. Med.*, January, 1954) have studied the antimycobacterial activity of a peptide preparation derived from calf thymus. The experiments arose during a study of the local biochemical environment and their effect on tubercle

bacilli in tissues, when it was found that some basic proteins had the ability to inhibit the growth of mycobacteria *in vitro*. Calf thymus was used as a source of protein, and it was found that extraction with aqueous ethanol yielded fractions highly active against tubercle bacilli. By a detailed process involving acid extraction, precipitation with picric acid, ethanol extraction and acetone precipitation, a substance identified as a peptide was obtained which was readily soluble in water and which withstood autoclaving. Tests on a series of acid-fast bacteria showed that when added to a basal medium in a final concentration of 300 micrograms per millilitre, the growth of all except the avian strain was completely inhibited, and one to ten micrograms per millilitre partially inhibited them. The addition of casein hydrolysate or beef heart infusion to the medium greatly reduced the activity of the peptide. Similar peptide substances could be extracted from spleen lymph nodes and pancreas, but not from lung or liver. The bacteriostatic effect of the material was often slow, and organisms explanted could be induced to growth after some days' contact with the peptide.

HYGIENE.

Swimming-Bath Purification.

THE PUBLIC HEALTH LABORATORY SERVICE WATER SUBCOMMITTEE (*Month. Bull. Health*, December, 1953) reports the results of an investigation of the most suitable organism to use as an indicator in the bacteriological control of swimming-bath purification. The investigation was limited to baths in which a process of continuous circulation, filtration and chlorination was in operation. Samples were examined for the presence of coliform organisms, hæmolytic streptococci, staphylococci and *Neisseria catarrhalis*, and also for general bacterial cleanliness by means of the plate count. The free and total residual chlorine levels and the pH of the water were measured at the time of sampling. Coliform organisms and *Neisseria catarrhalis* were seldom isolated from samples in which the free residual chlorine content exceeded 0·1 part per million; α-hæmolytic streptococci and staphylococci were too resistant to chlorination to be of much service as indicator organisms. Plate counts in nutrient agar at 37° C. and 22° C. showed a close correlation with the levels of free residual chlorine. In the samples examined the bathing loads encountered appeared to have little effect on the bacterial cleanliness of the water. When paired samples of water were taken from the inlet and outlet of a bath there was no appreciable difference in the bacterial quality of the two samples. The authors suggest as a recommended standard for swimming-bath water that no sample examined from a bath should contain any coliform organisms in 100 mils of water; in 75% of the samples examined from that bath the plate count at 37° C. from one ml of water should not exceed 10 colonies, and in the remainder it should not exceed 100 colonies. They also consider that it is possible to maintain bath water at this standard with as low a free residual chlorine content as 0·1 part per million, but this level allows no margin of safety and is in practice difficult to maintain. The level of 0·2 to 0·5 part per million recommended by the Ministry of Health in its report in 1951 should maintain swimming-bath water in a bacteriologically satisfactory condition provided that the chlorine is present as free residual chlorine.

Nasal Septum Perforation due to Soda Ash.

R. ARCHIBALD (*Brit. J. Indust. Med.*, January, 1954) reports an investigation of nasal septum perforations in a group of workmen employed in the handling of soda ash and reviews previous literature on nasal septum perforation. He states that nasal septum perforation has been reported in sufferers from syphilis and *rhinitis sicca*, in cocaine addicts and in people handling arsenic, salt, calcium nitrate, mixtures of silicon dioxide and anhydrous sodium carbonate, dichromates and calcium cyanamide. Five hundred and nineteen people were examined; 419 worked in the factory where soda ash was handled, and these were compared with 100 applicants for employment as controls. These were divided into two groups of workers, namely, ash packers and bag plant workers, and two control groups, one chosen from the two works and one from applicants for employment, and analysed. These groups are exposed respectively to large, moderate, slight, and negligible quantities of soda ash dust. The incidence of perforations and impending perforations in four groups with large, moderate, slight and no exposure to soda ash dust was respectively 11·1%, 12·1%, 1% and 0%. In addition, abnormalities of the septal mucosa which might be attributed to the effects of soda ash were seen in 8%, 6·4%, 5·5% and 0% respectively. The author describes a caliper to measure the diameter of the perforations.

Factors in Lung Cancer.

L. BRESLOW, L. HOAGLIN, G. RASMUSSEN AND H. ABRAMS (*Am. J. Pub. Health*, February, 1954) report the results of four years' study to determine the life-long occupational and tobacco-usage history of lung cancer patients. A total of 518 patients with lung cancer diagnosed histopathologically, together with a similar number of random controls—patients admitted to the same hospitals for other diseases of the same age, sex and race—were interviewed by one of two investigators experienced in occupational analysis. The information was then statistically analysed. It was found that 93% of cancer patients and only 76% of controls smoked cigarettes; 74% of cancer patients and only 42% of controls had smoked one or more packets of cigarettes a day over the preceding twenty years. Other criteria investigated indicated that lung cancer patients smoked cigarettes to a greater extent than did the control group. The authors consider that the data in this study constitute still another link in the chain of evidence connecting lung cancer with cigarette smoking, and that it is time for those concerned with health education and with the ethics of advertising, at least in health and medical journals, to take note. Further investigation should seek the exact component of cigarette smoke-tar, arsenic or other substance which is responsible. The data also suggest that several occupations, in addition to those previously identified as having an ætiological relationship, may be involved in the development of lung cancer. These occupations include those of welders, a group including steam fitters, boiler-makers and asbestos workers, crane operators in the metal industry, occupations associated with the extraction of lead, zinc and copper ore, marine engineers, construction painters and commercial cooks. These are in addition to occupations involving exposure to radioactive and chromate ores and asbestos, which previous studies have implicated.

Evaluation of a Silicone Protective Cream.

R. R. SUSKIND (*Arch. Indust. Hyg.*, February, 1954) appraises a new industrial protective cream in which a silicone fluid of the polymerized methyl siloxane type is incorporated as the protective agent in a bentonite base. Studies indicate that the silicones are very low in toxicity. Observations reported show that the formulation appears to have considerable protective value clinically against light petroleum oils and irritants, such as rust-preventives dissolved in such media, and against insoluble cutting oils, soluble coolants, aqueous solutions of sulphuric acid and metallic dusts. *In vitro* films of the formulation appeared to be relatively stable when immersed in aqueous solutions of soap, ethyl alcohol, several commonly used irritant salts, slaked lime, ammonium hydroxide, formalin and sulphuric acid. *In vitro* the cream appears to be relatively unaffected by cutting oils, soluble coolants, light petroleum oil, water and ethylene glycol. Relative protection was observed clinically against petroleum fractions of low boiling point, such as Stoddard solvent and petroleum spirits, when the cutaneous exposure was intermittent and when the solvent contained a small amount of light petroleum oil. No clinical protection was observed with frequently repeated cutaneous contact with gasoline, naphtha, Stoddard solvent, petroleum spirits and lacquer thinner. No clinical protection was observed against the irritant effects of immersion in a sodium silicate solution.

Sickness Absence Before Coronary Heart Disease.

J. HEADY, J. MORRIS, F. LLOYD AND P. RAFFLE (*Brit. J. Indust. Med.*, January, 1954) investigated records of London Transport Executive employees in order to prove or disprove the belief that coronary (ischæmic) heart disease affects healthy people without warning and in order to determine whether any previous indications of future coronary disease are apparent in the histories of those later affected with this disease. The sickness absence experience before the onset of the first clinical episode of coronary heart disease in a group of drivers and male conductors of the London Transport Executive was compared with that of a group of controls matched for sex, age, job and length of service. No significant differences at the 5% level were found between the two groups, in the number of absences, in the total number of days of absence, or in the distribution of different types of absences.

Public Health.

NATIONAL HEALTH ACT, 1953.

NATIONAL HEALTH (PHARMACEUTICAL BENEFITS) REGULATIONS.

THE following regulations under the *National Health Act*, 1953, were notified in the *Commonwealth of Australia Gazette*, Number 30A, of May 12, 1954.[1]

Citation.

1. These Regulations may be cited as the National Health (Pharmaceutical Benefits) Regulations.

Interpretation.

2.—(1.) In these Regulations, unless the contrary intention appears—

"authorized form" means a form authorized by the Director-General;

"authorized prescription form" means a paper, not less than five or more than six inches in length and not less than three or more than four inches in breadth, on which appear the name and address of a medical practitioner and at the top of which are written the letters "N.H.S." and, in the case of a prescription written for a pensioner pharmaceutical benefit, the words "Pensioner Benefit";

"entitlement card" means an entitlement card issued by the Commonwealth to a pensioner for the purposes of Part IV. and Part VII. of the Act;

"pensioner pharmaceutical benefit" means a pensioner pharmaceutical benefit under paragraph (*b*) of subsection (1.) of section 85 of the Act as affected by regulations 9, 10 and 11 of these Regulations;

"pension number", in relation to a pensioner, means his pension number appearing on his entitlement card;

"the Act" means the *National Health Act*, 1953;

"the Australian Pharmaceutical Formulary" means the latest edition for the time being of the book called the Australian and New Zealand Pharmaceutical Formulary published by the Australian and New Zealand Pharmaceutical Association, or, if that edition has been added to or amended, that edition as affected by those additions or amendments;

"the British Pharmaceutical Codex" means the latest edition for the time being of the book called the British Pharmaceutical Codex published by direction of the Council of the Pharmaceutical Society of Great Britain, or, if that edition has been added to or amended, that edition as affected by those additions or amendments;

"the British Pharmacopœia (1948)" means the edition of the book called the British Pharmacopœia published under the direction of the General Medical Council of the United Kingdom in the year 1948 as affected by the additions or amendments contained in the 1951 Addendum to that book;

"the United States Pharmacopœia" means the latest edition for the time being of the book called the Pharmacopœia of the United States of America prepared by the Committee of Revision and published by authority of the United States Pharmacopœial Convention, or, if that edition has been added to or amended, that edition as affected by those additions or amendments;

"trading hours", in relation to an approved pharmaceutical chemist, means his trading hours established by or under the law of the State or Territory in which his premises are situated.

(2.) For the purposes of these Regulations—

(*a*) the abbreviations appearing in the columns headed "Strength" and "Form of Unit" in the First and Second Schedules have the following meanings:

"amp." means ampoule;
"cc." means cubic centimetres;
"fl. oz." means fluid ounces of 480 minims;
"G." means grammes;
"γ" means microgrammes;
"gr." means grains;
"hypo. tab." means hypodermic tablet;
"I.M." means intramuscular;
"I.U." means international units determined in the year 1950 by the Expert Committee on Biological Standardization of the World Health Organization;
"I.V." means intravenous;
"mg." means milligrammes;
"M." means millions of organisms;
"ml." means millilitres;
"min." means minims;
"U." means units;
"U.S.P." means the United States Pharmacopœia; and

(*b*) the letters appearing in the column headed "Brand" in the First and Second Schedules denote the manufacturer whose name is specified in relation to those letters in the following table:

[The table is omitted owing to lack of space.]

(3.) In these Regulations, unless the contrary intention appears, a reference to prescribing or to the writing of a prescription shall be read as a reference to the writing of a prescription for the supply of a pharmaceutical benefit under Part VII. of the Act.

(4.) A disease or purpose specified in the column headed "Disease or Purpose" in the Second Schedule applies in relation to each form of the drug or medicinal preparation in relation to which that disease or purpose is specified.

(5.) Unless the contrary intention appears, weights and measures howsoever represented or expressed in these Regulations shall be deemed to relate to the table of weights and measures known as the "Apothecaries' Table of Weights and Measures" that appears in the twelfth revision of the United States Pharmacopœia.

(6.) In these Regulations, a reference to a Schedule by number shall be read as a reference to the Schedule to these Regulations so numbered, and a reference to a Form by letter shall be read as a reference to the Form so lettered in the Sixth Schedule.

(7.) Strict compliance with the Forms contained in the Sixth Schedule is not necessary and substantial compliance is sufficient.

Delegation.

3.—(1.) The Director-General may, in relation to a matter or class of matters, or to a State or part of the Commonwealth, by writing under his hand, delegate any of his powers and functions under these Regulations (except this power of delegation) to a Deputy Director of Health or to an officer of the Commonwealth Department of Health who is a pharmacist.

(2.) A power or function so delegated may be exercised or performed by the delegate with respect to the matter or class of matters, or with respect to the State or part of the Commonwealth, specified in the instrument of delegation.

(3.) A delegation under this regulation is revocable at will and does not prevent the exercise of a power or the performance of a function by the Director-General.

Persons Not Entitled to Receive Pharmaceutical Benefits.

4. A person who is a passenger or a member of the crew on a foreign-going ship as defined by the *Navigation Act*, 1912-1953, is not entitled to receive a pharmaceutical benefit.

Application for Approval by a Pharmaceutical Chemist or Hospital Authority.

5. The Director-General may refuse to entertain an application by a pharmaceutical chemist or a hospital authority for approval under Part VII. of the Act unless the application for approval is on and in accordance with Form A, Form B or Form C, whichever is appropriate, or in such form as the Director-General specially permits.

Signs to be Displayed by Pharmaceutical Chemists.

6.—(1.) An approved pharmaceutical chemist shall display a sign in accordance with Form D in a conspicuous place in or on each of the premises in respect of which he is approved in such a manner as to be readily visible to persons who enter those premises.

(2.) The last preceding sub-regulation does not apply to or in relation to a friendly society dispensary the approval

[1] The schedules to the regulations are not published herewith. The regulations with the schedules (Statutory Rules, 1954, Number 54) may be obtained from the Commonwealth Government Printer, price 2s. 3d.

of which is limited in accordance with sub-section (3.) of section 91 of the Act.

Penalty: Ten pounds.

Certain Requirements to be Met After Cancellation et cetera of Approval.

7. Where the approval of an approved pharmaceutical chemist is suspended, revoked or cancelled, the approved pharmaceutical chemist—

(*a*) shall, if the Director-General so requests, deliver up to the Director-General all documents and forms supplied to him by the Commonwealth with respect to the provision of pharmaceutical benefits other than documents or forms that he has parted with in accordance with Part VII. of the Act and these Regulations or the Regulations repealed by that Part; and

(*b*) shall not display a sign indicating that he has been, or is, approved to supply pharmaceutical benefits.

Penalty: Fifty pounds.

General Pharmaceutical Benefits.

8.—(1.) The drugs and medicinal preparations that may be prescribed for supply, supplied and received as general pharmaceutical benefits are those specified in the First and Second Schedules.

(2.) Except as provided by the next succeeding sub-regulation, the general pharmaceutical benefits specified in the Second Schedule may be prescribed by a medical practitioner for the purposes of Part VII. of the Act only for the treatment of a disease or for a purpose specified in that Schedule in relation to the general pharmaceutical benefit.

(3.) A medical practitioner may, in respect of a pensioner, prescribe the following drugs for the treatment of any disease from which the pensioner is suffering: Quinine Bisulphate, Quinine Dihydrochloride, Quinine Hydrochloride, Quinine Sulphate.

(4.) Water for Injection as prescribed in the First Schedule is not a general pharmaceutical benefit unless it is prescribed for supply in conjunction with and for administration with—

(*a*) Injection of Penicillin as prescribed as a general pharmaceutical benefit;

(*b*) Injection of Procaine Penicillin (Crystalline) as prescribed as a general pharmaceutical benefit;

(*c*) Dihydrostreptomycin as prescribed as a general pharmaceutical benefit;

(*d*) Streptomycin as prescribed as a general pharmaceutical benefit; or

(*e*) another drug or medicinal preparation that is prescribed as a general pharmaceutical benefit in the form of a hypodermic tablet.

Exceptions to Pensioner Benefits in British Pharmacopœia.

9.—(1.) The following drugs and medicinal preparations, being drugs and medicinal preparations that are the subject of monographs in the British Pharmacopœia, are not pensioner pharmaceutical benefits:

(*a*) drugs and medicinal preparations that are medicinal gases;

(*b*) drugs and medicinal preparations containing diamorphine hydrochloride;

(*c*) drugs and medicinal preparations that are prescribed as general pharmaceutical benefits by the last preceding regulation.

(2.) A drug or medicinal preparation specified in the following list is not a pensioner pharmaceutical benefit unless it is an ingredient in a medicinal compound that contains another drug or medicinal preparation that is a pensioner pharmaceutical benefit: Æther Anæstheticus, Æther Vinylicus, Æthylis Chloridum, Alcohol, Alcohol Tribromoethylicum, Amyleni Hydras, Bromethol, Chloroformum, Cyclopropanum, Spiritus Methylatus Industrialis, Thiopentonum Sodium, Trichloroæthylenum.

Benefits Available to Pensioners.

10. A drug or medicinal preparation specified in the Third Schedule is a drug or medicinal preparation available to pensioners if the drug or medicinal preparation—

(*a*) is in the form of a cachet, capsule, cream, eye ointment, extract, glycerine, injection, liniment, liquor, mixture, ointment, pill, suppository, syrup or tablet indicated in that Schedule in the name or formula of that drug or medicinal preparation; or

(*b*) is an ingredient in a medicinal compound that contains another drug or medicinal preparation that is a pensioner pharmaceutical benefit.

Forms of Pensioner Pharmaceutical Benefits.

11. A drug or medicinal preparation prescribed for supply in the form of a cachet, capsule, pill or tablet is not a pensioner pharmaceutical benefit unless the form in which it is prescribed for supply is a form specified in relation to that drug or medicinal preparation in the Third Schedule or in a monograph in the British Pharmacopœia.

Maximum Quantity or Number of Units of Pharmaceutical Benefits.

12.—(1.) The maximum quantity or number of units of a general pharmaceutical benefit that may be prescribed for supply at any one time is the quantity or number of units specified in the First or the Second Schedule, as the case may be.

(2.) The maximum quantity or number of units of a pensioner pharmaceutical benefit that may be prescribed for supply at any one time is, in respect of a form specified in the Fourth Schedule, such quantity or number of units as is specified in relation to that form in that Schedule.

Pharmaceutical Benefits that May be Supplied Under Section 93.

13.—(1.) The pharmaceutical benefits that a medical practitioner is authorized to supply for the purpose of section 93 of the Act are the general pharmaceutical benefits the names or formulæ of which are specified in the Fifth Schedule and, subject to these Regulations, he may obtain those pharmaceutical benefits in the forms and quantities specified in that Schedule.

(2.) Where more than one form of a unit is specified in the Fifth Schedule, the maximum quantity or number of units of each of the forms so specified may be obtained by a medical practitioner under this regulation.

(3.) Where in the First Schedule more than one strength is specified in relation to a form of a drug or medicinal preparation that is specified in the Fifth Schedule, a medical practitioner may, for the purpose of section 93 of the Act, obtain that form of the drug or medicinal preparation in all or any of those strengths if the quantity or number of units of each strength obtained by the medical practitioner is the quantity or number of units contained in a standard package.

(4.) The last preceding sub-regulation does not entitle a medical practitioner to obtain a total quantity or number of units of more than one strength of a particular form of a drug or medicinal preparation that exceeds the maximum quantity or number of units specified in relation to that form in the Fifth Schedule.

(5.) In this regulation "standard package" means a package containing such quantity or number of units as the Director-General determines in relation to a specified product of a specified manufacturer.

Medical Practitioners Excepted from the Authorization Conferred by Section 93.

14. A medical practitioner who is an approved medical practitioner and a medical practitioner who is practising his profession on a ship are not authorized to supply pharmaceutical benefits under section 93 of the Act.

Obtaining of Drugs by Medical Practitioners for Purpose of Section 93.

15.—(1.) A medical practitioner shall not obtain a drug or medicinal preparation for the purpose of section 93 of the Act by any means other than by signing and lodging with an approved pharmaceutical chemist an order, in duplicate, on and in accordance with the authorized form.

(2.) A medical practitioner is not entitled to obtain a pharmaceutical benefit for the purpose of section 93 of the Act more often than once in any one month.

(3.) Where a medical practitioner has obtained a pharmaceutical benefit in accordance with this regulation, he is not entitled to obtain any further supply of that pharmaceutical benefit while he has in his possession a quantity or number of units of that pharmaceutical benefit equal to or greater

than the maximum quantity or number of units allowable under regulation 13 of these Regulations.

Supply of Pharmaceutical Benefits by Chemists for Purpose of Section 93.

16. An approved pharmaceutical chemist shall not supply a pharmaceutical benefit on an order given under the last preceding regulation unless the medical practitioner whose signature appears on the order is known to him or, if the medical practitioner is not known to him, he obtains from the person who presents the order particulars of the full name, address and medical registration number of the medical practitioner and endorses those particulars on the back of the order form.

Penalty: Twenty pounds.

Supply of Particular Brand for Purpose of Section 93.

17. Where a medical practitioner specifies in an order given under regulation 15 of these Regulations a particular brand of a pharmaceutical benefit specified in the Fifth Schedule, an approved pharmaceutical chemist shall supply that brand of the pharmaceutical benefit.

Penalty: Fifty pounds.

Payment for Pharmaceutical Benefits Supplied for the Purpose of Section 93.

18. An approved pharmaceutical chemist who has supplied a pharmaceutical benefit to a medical practitioner for the purpose of section 93 of the Act in accordance with these Regulations is entitled to payment from the Commonwealth in respect of the supply of that pharmaceutical benefit at such rate and subject to such conditions as are determined by the Minister and applicable at the time of the supply.

Writing of Prescriptions.

19.—(1.) A prescription is not duly written unless the medical practitioner who writes the prescription—

(*a*) writes the prescription in his own handwriting, unless the Director-General otherwise allows, on an authorized prescription form;

(*b*) writes the prescription in duplicate and marks that duplicate with the word "Duplicate";

(*c*) dates and signs the prescription;

(*d*) states the name and address of the person for whom the pharmaceutical benefit is to be supplied;

(*e*) where the prescription is for the supply of a general pharmaceutical benefit—identifies that benefit by its name as specified in the First or the Second Schedule or by the trade name of a manufacturer an abbreviation of whose name appears in the column headed "brand" in that Schedule;

(*f*) Where the prescription is for the supply of a pensioner pharmaceutical benefit—

(i) states the pension number of the pensioner to whom the pensioner pharmaceutical benefit is to be supplied; and

(ii) if the benefit to be supplied consists of a single drug, indicates the mode in which the benefit is to be used; and

(*g*) where the prescription is for the supply of a general pharmaceutical benefit specified in the Second Schedule —endorses the prescription in his own handwriting with the words "Restricted Drug".

(2.) A prescription is not duly written if the prescription—

(*a*) prescribes a general pharmaceutical benefit and a pensioner pharmaceutical benefit;

(*b*) includes two prescriptions for the same pharmaceutical benefit;

(*c*) prescribes pharmaceutical benefits for more than one person;

(*d*) prescribes more than two general pharmaceutical benefits or more than two pensioner pharmaceutical benefits;

(*e*) prescribes a pensioner pharmaceutical benefit by reference to a brand or in any other manner that indicates a brand; or

(*f*) prescribes for the supply to a person of a pharmaceutical benefit for the supply of which to the same person another prescription has been written by the same medical practitioner on the same day.

(3.) For the purposes of paragraph (*d*) of the last preceding sub-regulation, a prescription for the supply as a general pharmaceutical benefit of two or more strengths of a form of one of the following drugs or medicinal preparations shall be deemed to prescribe one general pharmaceutical benefit: Oily Injection of Aurothioglucose, Injection of Calcium Aurothiomalate, Pertussis Vaccine (Phase 1), Aqueous Injection of Sodium Aurothiomalate, Oily Injection of Sodium Aurothiomalate.

(4.) A prescription for Cortisone Acetate shall be deemed not to be duly written—

(*a*) unless the medical practitioner who writes the prescription has applied to the Director-General in accordance with Form E for authority to write such a prescription and that authority has been given on a form issued and numbered by the Director-General; or

(*b*) if he writes another prescription on the same authorized prescription form as that on which he prescribes Cortisone Acetate.

Repeat Prescriptions.

20.—(1.) Subject to these Regulations, a medical practitioner may, in a prescription, direct that the supply of a pharmaceutical benefit be repeated a specified number of times not exceeding—

(*a*) in the case of a general pharmaceutical benefit—the number specified in the First or the Second Schedule in relation to that benefit; or

(*b*) in the case of a pensioner pharmaceutical benefit—such number as is determined by the Director-General in respect of the pensioner pharmaceutical benefit in the form specified in the prescription.

(2.) The last preceding sub-regulation does not entitle a medical practitioner to direct a repeat unless—

(*a*) in the case of a general pharmaceutical benefit—the quantity or number of units that he directs to be supplied on the first occasion is the maximum quantity or number of units specified in relation to that benefit in the First or the Second Schedule; or

(*b*) in the case of a pensioner pharmaceutical benefit in respect of which a maximum quantity or number of units is specified in the Fourth Schedule—the quantity or number of units that he directs to be supplied on the first occasion is that maximum.

Prescription of Dangerous Drugs.

21.—(1.) A prescription for the supply of a dangerous drug as a pharmaceutical benefit is not duly written if the medical practitioner who writes the prescription writes a prescription for another pharmaceutical benefit on the same authorized prescription form as that on which he prescribes the dangerous drug and he directs that one of those pharmaceutical benefits is to be supplied more than once.

(2.) In this regulation, "dangerous drug" means a drug or medicinal preparation in respect of which the law of the State or Territory in which the prescription is written provides that a pharmaceutical chemist who dispenses that drug or medicinal preparation or who dispenses it on the last of a number of occasions of supply indicated in a prescription for its supply, shall take possession of the prescription and cancel it or deliver it to the authority administering that law.

Recovery of Cost of Pharmaceutical Benefits Prescribed in Excessive Quantities.

22. If a Committee of Inquiry established under Division 2 of Part VIII. of the Act reports that, in its opinion, a medical practitioner has prescribed a quantity or number of units of a pharmaceutical benefit that is greater than the quantity or number of units of that pharmaceutical benefit that could reasonably be necessary for the proper medical treatment of the person in respect of whose medical treatment the prescription was written, the medical practitioner is liable to repay to the Commonwealth the amount of the cost to the Commonwealth of the excess quantity or number of units of the pharmaceutical benefit supplied on the prescription and that amount is recoverable as a debt due to the Commonwealth.

Supply of Pharmaceutical Benefits on Prescriptions.

23.—(1.) An approved pharmaceutical chemist, an approved medical practitioner or an approved hospital authority (being the proprietor of a private hospital) is not authorized

to supply a drug or medicinal preparation as a pharmaceutical benefit unless—

(a) subject to the next succeeding regulation, the prescription for its supply is surrendered to him;

(b) the prescription for its supply is duly written in accordance with these Regulations and is accompanied by a duplicate of the prescription on an authorized prescription form;

(c) where the prescription is for the supply of a pensioner pharmaceutical benefit—the entitlement card issued to the pensioner to whom the pensioner pharmaceutical benefit is to be supplied is produced; and

(d) the prescription for its supply is dated within six months before the date of its presentation.

(2.) An approved pharmaceutical chemist, an approved hospital authority or an approved medical practitioner is not authorized to supply Cortisone Acetate as a pharmaceutical benefit unless the prescription for its supply is accompanied by a numbered authority given under sub-regulation (4.) of regulation 19 of these Regulations.

Supply of Pharmaceutical Benefit Before Surrender of Written Prescription.

24.—(1.) A pharmaceutical benefit may be supplied by an approved pharmaceutical chemist or an approved hospital authority before the prescription for that pharmaceutical benefit is surrendered to him where, in a case of urgency, a medical practitioner, by oral or other means, communicates the prescription to the approved pharmaceutical chemist or approved hospital authority.

(2.) A medical practitioner who has communicated a prescription in the manner referred to in the last preceding sub-regulation shall reduce the communicated prescription to writing in accordance with regulation 19 of these Regulations and within twenty-four hours of the communication dispatch the prescription so written to the approved pharmaceutical chemist or approved hospital authority who supplied the pharmaceutical benefit.

Penalty: Ten pounds.

(3.) This regulation does not apply to the following pharmaceutical benefits:

Cortisone Acetate.

A pharmaceutical benefit that is a drug or medicinal preparation the prescription for which is required to be in writing by or under a law of the State or Territory of the Commonwealth in which the premises of the approved pharmaceutical chemist or approved hospital authority are situated.

(4.) In this regulation, "approved hospital authority" means a proprietor of a private hospital who is an approved hospital authority.

Supply of Pharmaceutical Benefit on First Presentation of Prescription.

25. An approved pharmaceutical chemist, approved medical practitioner or approved hospital authority (being the proprietor of a private hospital) is not authorized to supply a pharmaceutical benefit on the first presentation of a prescription unless—

(a) he writes on the back of the authorized prescription form and on the back of the duplicate his name and the number of his approval (if any) under the Act;

(b) if two pharmaceutical benefits have been prescribed on the authorized prescription form—he marks on that form and on the duplicate the first-written pharmaceutical benefit with the letter "A" and the other pharmaceutical benefit with the letter "B" and initials that marking; and

(c) in the case of an approved pharmaceutical chemist—he allots a serial number to the prescription and writes that serial number on the authorized prescription form and on the duplicate.

Supply of Repeats.

26.—(1.) A pharmaceutical benefit shall not be supplied a number of times greater than the number specified, in accordance with regulation 20 or regulation 27 of these Regulations, in the prescription.

(2.) Where a prescription directs that a pharmaceutical benefit is to be supplied more than once, that benefit shall not be supplied (whether by the same supplier or by different suppliers) more than once on the same day.

Penalty: Ten pounds.

Special Approval for Repeats.

27. In special circumstances, the Director-General may authorize, subject to such conditions as he determines, a pharmaceutical benefit to be prescribed by a medical practitioner and to be supplied a number of times greater than the number of times otherwise allowed by regulation 20 of these Regulations.

Repeat Authorizations.

28.—(1.) An approved pharmaceutical chemist who supplies a pharmaceutical benefit on surrender of—

(a) a prescription that contains a direction to supply that benefit more than once; or

(b) a repeat authorization issued in accordance with this regulation.

shall, unless no further supply of the pharmaceutical benefit (after the supply that he is making) is authorized—

(c) issue, to the person presenting the prescription or repeat authorization, a repeat authorization, on and in accordance with an authorized form, in respect of each benefit the further supply of which is authorized;

(d) write the repeat authorization in duplicate and mark that duplicate with the word "Duplicate";

(e) attach the repeat authorization to the duplicate of the prescription;

(f) in the case of the supply of a pharmaceutical benefit on the first occasion—mark on the repeat authorization the number of his approval under the Act and the serial number allotted by him to the prescription; or

(g) in the case of the supply of a pharmaceutical benefit on a subsequent occasion—mark on the repeat authorization that he issues the numbers marked, in pursuance of the last preceding sub-paragraph, on the repeat presented to him.

(2.) A pharmaceutical benefit shall not be supplied upon surrender of the duplicate of a prescription unless—

(a) there is attached to that duplicate a repeat authorization—

(i) duly related to the duplicate prescription by a number or numbers;

(ii) where the prescription refers to two pharmaceutical benefits—referring to the first-written pharmaceutical benefit by the letter "A" and the second-written pharmaceutical benefit by the letter "B"; and

(iii) indicating that the pharmaceutical benefit to be supplied has not been supplied for the number of times directed in the prescription; and

(b) the person obtaining the pharmaceutical benefit surrenders the repeat authorization to the person supplying the pharmaceutical benefit.

(3.) An approved pharmaceutical chemist who supplies a benefit on presentation of a repeat authorization shall write his name on the back of the repeat authorization.

Penalty: Ten pounds.

Supply of Brand of General Pharmaceutical Benefit Specified in a Prescription.

29. Where a prescription for the supply of a general pharmaceutical benefit, presented to an approved pharmaceutical chemist, approved hospital authority or approved medical practitioner, indicates a brand of that general pharmaceutical benefit, the approved pharmaceutical chemist, approved hospital authority or approved medical practitioner, as the case may be, shall not supply any other brand of that general pharmaceutical benefit unless the Director-General otherwise allows.

Penalty: Fifty pounds.

Receipts.

30.—(1.) Subject to this regulation, upon the supply to a person of a pharmaceutical benefit by an approved pharmaceutical chemist or an approved medical practitioner, that person shall sign and date a receipt for that pharmaceutical benefit, and, if that person is not the person for whose treatment the prescription was written, that person shall write on the back of the authorized prescription form or repeat authorization form, as the case may be, his address and a statement that he is obtaining the benefit for and on behalf of the person for whose treatment the prescription was written.

(2.) An approved pharmaceutical chemist or an approved medical practitioner shall not demand a receipt for the

supply of a pharmaceutical benefit to a person unless the approved pharmaceutical chemist or approved medical practitioner has supplied that pharmaceutical benefit to that person.

(3.) Where a pharmaceutical benefit is supplied by an approved pharmaceutical chemist or an approved medical practitioner through the post or by rail or other means of transport and it is impracticable for him to obtain a receipt in accordance with the preceding provisions of this regulation, the approved pharmaceutical chemist or approved medical practitioner shall certify on the back of the authorized prescription form or repeat authorization form that he has supplied the pharmaceutical benefit, stating the date on which the supply was made and also particulars of the means by which the pharmaceutical benefit was supplied.

Penalty: Twenty pounds.

Presentation of Prescriptions in Trading Hours.

31.—(1.) An approved pharmaceutical chemist shall, at all times, keep prominently displayed at each of the premises in respect of which he is approved, so as to be readily visible to persons who enter each premises, a notice in an authorized form setting out the trading hours during which services for the supply of pharmaceutical benefits are available.

(2.) Subject to the next succeeding regulation, a person is entitled on demand to be supplied with a pharmaceutical benefit from an approved pharmaceutical chemist only during trading hours.

Presentation of Urgent Prescriptions.

32.—(1.) A prescription for the supply of a pharmaceutical benefit marked "Urgent", that marking being initialled by the medical practitioner writing the prescription, may be presented at any time to an approved pharmaceutical chemist at the premises in respect of which he is approved.

(2.) Subject to the next succeeding sub-regulation, where a prescription referred to in the last preceding sub-regulation is so presented, the approved pharmaceutical chemist shall, as soon as practicable, supply the pharmaceutical benefit.

Penalty: Ten pounds.

(3.) An approved pharmaceutical chemist may refuse to supply a pharmaceutical benefit outside trading hours unless a special charge is paid in accordance with the next succeeding regulation.

Special Charges for Supply Outside Trading Hours.

33.—(1.) An approved pharmaceutical chemist is entitled to make a special charge of such amount as is determined by the Director-General in respect of the supply of a pharmaceutical benefit outside trading hours.

(2.) Where two or more prescriptions are presented to an approved pharmaceutical chemist at the same time, being outside trading hours, for the supply of pharmaceutical benefits to the same person, the approved pharmaceutical chemist is entitled to make one special charge only.

Special Charge for Delivery.

34. When a pharmaceutical benefit is supplied by delivery at or to a place other than premises in respect of which the approved pharmaceutical chemist is approved, the premises at which an approved medical practitioner carries on his practice or the hospital in respect of which an approved hospital authority is approved, as the case may be, the pharmaceutical chemist, medical practitioner or hospital authority is entitled to make a special charge equal to the cost of delivery and to refuse to deliver the pharmaceutical benefit unless the special charge is paid by or on behalf of the person to whom the pharmaceutical benefit is to be supplied.

Retention of Prescriptions et cetera.

35. Subject to regulation 21 of these Regulations, an approved pharmaceutical chemist, approved medical practitioner or approved hospital authority (being the proprietor of a private hospital) who or which supplies pharmaceutical benefits shall retain in his or its possession for a period of not less than twelve months from the respective dates on which prescriptions for the supply of the pharmaceutical benefits were written—

(*a*) in the case of prescriptions that do not bear instructions to supply pharmaceutical benefits more than once—the duplicates of those prescriptions;

(*b*) in the case of prescriptions that bear instructions to supply pharmaceutical benefits more than once—the duplicates of repeat authorizations issued in accordance with regulation 28 of these Regulations;

(*c*) where the pharmaceutical benefits are supplied on the last occasion on which supply is authorized—the duplicates of the prescriptions in respect of which repeat authorizations were issued; and

(*d*) the duplicates of order forms lodged under regulation 15 of these Regulations.

Penalty: Fifty pounds.

Proper Stocks to be Kept.

36. An approved pharmaceutical chemist shall, as far as practicable, keep in stock an adequate supply of all drugs and medicinal preparations that he may reasonably be expected to be called upon to supply as pharmaceutical benefits or as ingredients of pharmaceutical benefits.

Penalty: Ten pounds.

Forms Suspected Forged et cetera.

37. Where an approved pharmaceutical chemist suspects that a prescription has not been signed by a medical practitioner or has been forged or fraudulently obtained, he is entitled, before supplying the pharmaceutical benefit specified in the prescription, to require that there be furnished to him a statement in accordance with an authorized form.

Standards of Composition and Purity of Pharmaceutical Benefits.

38.—(1.) The standards of composition and purity of drugs and medicinal preparations that may be supplied as pharmaceutical benefits or may be ingredients of pharmaceutical benefits are as prescribed by this regulation.

(2.) A drug or medicinal preparation that is a general pharmaceutical benefit specified in the First or the Second Schedule shall conform to such standards of composition and purity as are specified in relation to that drug or medicinal preparation in the British Pharmacopœia, the British Pharmaceutical Codex or the Australian Pharmaceutical Formulary, as the case may be.

(3.) A drug or medicinal preparation that is a pensioner pharmaceutical benefit referred to in sub-paragraph (i) of paragraph (*b*) of sub-section (1.) of section 85 of the Act shall conform to the standards of composition and purity constituted by the statements in the monograph in the British Pharmacopœia relating to that drug or medicinal preparation.

(4.) A drug or medicinal preparation that is a pensioner pharmaceutical benefit specified in the Third Schedule shall—

(*a*) where the letters "A.P.F." appear after the name or formula of the drug or medicinal preparation—conform to the standards of composition and purity constituted by the description of that drug or medicinal preparation in the Australian Pharmaceutical Formulary;

(*b*) where the letters "B.P.C." appear after the name or formula of the drug or medicinal preparation—conform to the standards of composition and purity constituted by the statements in the monograph relating to that drug or medicinal preparation in the British Pharmaceutical Codex; and

(*c*) where no letters appear after the name or formula of the drug or medicinal preparation—conform to the standards of composition and purity constituted by the statements in the monograph relating to that drug or medicinal preparation in the British Pharmacopœia (1948).

Samples.

39. When a sample of a drug, medicine or substance that may be supplied as, or may be an ingredient of, a pharmaceutical benefit is taken in pursuance of the power conferred upon an authorized person by section 104 of the Act and that sample conforms to the standards of composition and purity prescribed by the last preceding regulation, payment shall be made by the Commonwealth as if the quantity of the drug, medicine or substance taken as a sample had been supplied as a pharmaceutical benefit.

Entitlement Cards.

40. For the purposes of paragraph (*e*) of sub-section (1.) of section 104 of the Act and paragraph (*c*) of sub-regulation

(1.) of regulation 23 of these Regulations, an authorized person may, in his own name or in a fictitious name, present an entitlement card purporting to have been issued to a pensioner.

Surrender of Forms.

41.—(1.) The Director-General may, by notice in writing served on a person, require that person to surrender to the Director-General or to a person specified in the notice, within a time specified in the notice, any unused forms that have been supplied to that person by or on behalf of the Commonwealth under or for the purposes of the Act or these Regulations and that are in the possession of the person.

(2.) A person upon whom a notice given in pursuance of the last preceding sub-regulation is served shall comply with that notice.

Penalty: Ten pounds.

Use of Old Forms.

42. Where the Commonwealth supplies or has supplied a form that is substantially in accordance with a form prescribed by these Regulations or an authorized form, except that it bears a reference or references to the *Pharmaceutical Benefits Act*, 1947-1949, that form may be used for the purposes of these Regulations as if it were in accordance with the prescribed form or the authorized form, as the case may be, to which it substantially corresponds, and these Regulations apply in relation to that form as if it were in accordance with that prescribed form or that authorized form.

DANGEROUS DRUGS ACT, 1934, OF SOUTH AUSTRALIA.

THE following proclamation was published in the *South Australian Government Gazette*, Number 23, of May 27, 1954:

By virtue of the provisions of the Dangerous Drugs Act, 1934, and all other enabling powers, I, the said Governor's Deputy, with the advice and consent of the Executive Council, do hereby:

1. Vary the proclamation made on the 21st day of August, 1952, pursuant to the said Act and published in the *Government Gazette* of the same date at page 528, by deleting therefrom—

(1) 3-hydroxy-N-methylmorphinan and its salts.

(2) 3-methoxy-N-methylmorphinan and its salts.

2. Declare the subsection (1) of section 6 of the said Act shall cease to apply to—

(1) N-Allylnormorphine and its salts.

(2) 6-methyl-Δ6-desoxymorphine and its salts.

3. Declare that the said Act shall apply to the drugs specified in the schedule hereto in the same manner as it applies to the drugs mentioned in subsection (1) of section 4 thereof.

THE SCHEDULE.

(1) 6-methyl-Δ6-desoxymorphine and its salts.

(2) Racemorphan; Levorphan (3-hydroxy-N-methylmorphinan) and their salts.

(3) Racemethorphan Levomethorphan (3-methoxy-N-methylmorphinan) and their salts.

(4) Any preparation, admixture, extract, or other substance containing any proportion of any of the substances mentioned in this schedule.

Given under my hand and the public seal of South Australia, at Adelaide, this 27th day of May, 1954.

By command,

R. J. RUDALL, for Chief Secretary.

POLICE OFFENCES (AMENDMENT) ACT, 1908, AS AMENDED—WITHDRAWAL OF AUTHORITY TO BE IN POSSESSION OF DRUGS.

THE following notice has been published in the *New South Wales Government Gazette*, Number 85, of May 28, 1954:

It is hereby notified, for general information, that under the provisions of Regulation No. 25 of the *Police Offences (Amendment)* Act, 1908, as amended, the authority of Dr. Herbert Sheldon to be in possession of drugs to which the Act applies for the purpose of his profession and to issue prescriptions for such drugs is withdrawn as on and from Monday, 14th June, 1954.

C. A. KELLY.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

SOME NATIVE PLANTS AND THEIR USES.[1]

[From White's "Journal of a Voyage to New South Wales".]

August, 1788

THAT which we call the sweet tea is a creeping kind of vine, running to a great extent along the ground: the stalk is not so thick as the smallest honey suckle, nor is the leaf so large as the common bay leaf, though something similar to it: and the taste is sweet exactly like the licorice root of the shops. Of this the convicts and soldiers make an infusion which is tolerably pleasant and serves as no bad succedaneum for tea. Indeed were it to be met with in greater abundance, it would be found very beneficial to those poor creatures whose constant diet is salt provisions. In using it for medical purposes I have found it to be a good pectoral, and as I before observed not at all unpleasant. We have also a kind of shrub in this country resembling the common broom: which produces a small berry like a white currant but in taste more similar to a very green gooseberry. This has proved a good antiscorbutic, but I am sorry to add that the quantity to be met with is far from sufficient to remove the scurvy. That disorder still prevails with great violence, nor can we at present find any remedy against it notwithstanding that the country produces several sorts of plants and shrubs which in this place are considered as tolerable vegetables and used in common. The most plentiful is a plant growing on the seashore greatly resembling sage. Among it are often to be found samphire and a kind of wild spinage, besides a small shrub which we distinguish by the name of the vegetable tree and the leaves of which prove to be a pleasant substitute for vegetables.

Correspondence.

THE USE OF MUSCLE RELAXANTS IN ELECTRO-CONVULSIVE THERAPY.

SIR: I feel that I must answer the letter by Dr. N. E. Parker of the Brisbane Mental Hospital on his "simplification" of technique.

1. Atropine is given for two very good reasons: (a) to prevent excessive salivation which when inhaled during the period of glottic paralysis can cause serious pulmonary complications; (b) to minimize vagal effect and diminish the risk of ventricular fibrillation which may be induced during the passage of the electrical stimulus. The omission of atropine adds appreciably to the risk.

2. "Pentothal" in my opinion is essential in almost all cases. There is almost no increased risk with the addition of minimal "Pentothal". In over 15,000 anæsthetics for electro-convulsive therapy I have had no fatalities. As regards the sensation of the patient, a moderate percentage remember quite vividly the feeling of suffocation and immobility which "Brevidil" alone produces. I have personally experienced this feeling, which can only be described as the most terrible sensation I have ever experienced. The inability to breathe or even to move is the most frightening sensation I have ever experienced. Even if electro-convulsive therapy does cause retrograde amnesia there must still be some psychic trauma given if not remembered. In the event of the failure of the electro-convulsive therapy machine the patient is left

[1] From the original in the Mitchell Library, Sydney.

paralysed and, to say the least, frightened and uncomfortable. The whole of this unpleasant effect is removed quite easily by a small dose of "Pentothal". I venture to suggest if Dr. Parker experienced the effect of a relaxant on himself while fully conscious, he would agree with me.

3. The absence of an experienced anæsthetist. Almost all procedures in medicine and surgery are easy if all goes well. Is the average psychiatrist capable of dealing with all the complications which may occur? Laryngoscopy, intubation and bronchoscopy may be called for at a moment's notice to save a patient's life. I feel that these things are really the job for an experienced anæsthetist.

Maximum safety combined with maximum comfort for the patient are in my opinion far more important than mere "simplicity".

Yours, etc.,

85 Spring Street, Melbourne,
June 2, 1954.

VAL STEPHEN.

THE SAFEGUARDING OF AN ETHER VAPORIZER.

SIR: A relatively new type of circle absorber with an ether vaporizer attached and called the Mark II B.O.C. Circle Absorber is now being fitted to the British Oxygen Company's type "G" Boyle's machine. If the ether vaporizer is filled up to the correct level and then, while in the circuit, the oxygen by-pass is used, a large amount of liquid ether will be precipitated into the tubing leading to the patient, with possible disastrous results. This danger can be averted if the tube dipping into the ether container through which flow the fresh gases, including oxygen by-pass, is removed. The efficiency of the vaporizer is hardly affected, and it is now rendered completely safe. The ever-increasing popularity of the Boyle's machine throughout Australia makes this a timely warning.

Yours, etc.,

NORMAN R. JAMES,
Director of Anæsthesia.

The Royal Melbourne Hospital,
Parkville,
Victoria.
May 31, 1954.

CORTISONE AND RHEUMATIC DISEASE.

SIR: Thank you for publishing my letter. Unfortunately the heading of "Cortisone and Acute Rheumatism" does not agree with the subject matter of my letter. The title should be "Cortisone and Rheumatic Disease".

Yours, etc.,

143 Macquarie Street,
Sydney,
June 4, 1954.

M. NAOMI WING.

SIR: Despite Dr. Naomi Wing's interesting comments (M. J. AUSTRALIA, May 29, 1954) on the Mayo Clinic dosage of cortisone, I have seen few rheumatoid patients benefit from such low initial doses. And most rheumatologists elsewhere agree that they are inadequate. When I visited the Mayo Clinic recently I found that its problems differed from those of other rheumatic clinics. Having pioneered cortisone, it now finds itself a dumping ground for hypercortisonism. For every rheumatoid patient who comes for his initial doses of cortisone, ten come because the drug has failed elsewhere. And most of these, overdosed or suffering severe withdrawal reactions, are in bed or otherwise inactive. In estimating the patient's needs, the Rochester physicians are guided by biochemical rather than clinical criteria; they do not claim that the small doses of cortisone frequently suppress the arthritis. But the chief object of cortisone treatment elsewhere is to keep the patient active or working on the smallest effective dose. The successfully treated patients are nearly all at out-patient clinics in their home towns—not in hospital beds a thousand miles from home. Most active patients with rheumatoid arthritis need a commencing dose of 100 milligrammes daily. If this fails, cortisone should be withdrawn after a week; if it succeeds, it should be gradually tapered off to the correct dosage.

Yours, etc.,

34 Queen's Road,
Melbourne,
June 2, 1954.

M. KELLY.

Post-Graduate Work.

THE ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE.

Medical Post-Graduate Courses.

THE Royal Institute of Public Health and Hygiene conducts a recognized course of instruction (for post-graduate medical men and women only) for the certificate in public health examination of the Conjoint Board of the Royal College of Physicians of London and the Royal College of Surgeons of England. This leads to courses for the diploma in public health and for the diploma in industrial health. Students are also prepared for the diploma in industrial health examination of the Society of Apothecaries of London. The next course of instruction for the certificate in public health will commence on October 1, 1954. Further information, entry forms and prospectuses may be obtained from the Secretary of the Institute, 28 Portland Place, London, W.1, or from the Acting Dean, at 23 Queen Square, London, W.C.1.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR JULY, 1954.

Gynæcology and Obstetrics Refresher Course for General Practitioners.

A COURSE of lecture-demonstrations and ward rounds will be conducted by the honorary medical staff at the Women's Hospital from July 5 to 16. Residence at the hospital is available for a limited number. Enrolments should be made with the Post-Graduate Committee, from whom a detailed timetable is available. Fees are: for tuition, £12 12s., payable to the Post-Graduate Committee; for residence, £6 10s. per week, payable to the hospital.

Pathology for Primary F.R.A.C.S. Examination.

Lectures in the principles of pathology, suitable for candidates for the primary F.R.A.C.S. examination, will commence at the pathology department on Monday, July 5, and continue on Mondays and Wednesdays at 1.45 p.m. for six weeks. The fee for this course is £5 5s., payable to the Post-Graduate Committee.

Part I Courses for Higher Degrees and Diplomas.

During July, lecture times for candidates for Part I of higher degrees and diplomas will be as follows: pathology, 1.45 p.m. till 2.45 p.m.; anatomy, 2.45 p.m. till 3.45 p.m.; physiology, 4 p.m. till 5 p.m.

Pathology for M.C.R.A. and D.D.R. Part II Examinations.

Lectures in special pathology will be conducted as follows: July 6, Dr. J. Peters, "Tumours and Malformations of the Urinary Tract", at the lecture room, Prince Henry's Hospital. July 13, Dr. W. E. Fleming, "Pathology of the Jaws and Alveolus", at the X-ray department, Royal Melbourne Hospital. July 20, Dr. John Horan, "Tumours of the Alimentary Tract", at the pathology department, Saint Vincent's Hospital. July 27, lecturer to be arranged, "Pathology of the Lungs and Pleura". August 3 and 10, Dr. R. Kaye Scott, "Tumours of Bone", at the Cancer Institute. Classes will be held at 4.30 p.m. The fee for the course is £5 5s., payable to the Post-Graduate Committee.

Classes Commenced Previously.

Classes in medicine (at the Alfred Hospital), bacteriology, psychiatry, radiodiagnosis, ophthalmology and lectures at the Royal College of Obstetricians and Gynæcologists, which commenced previously, will be continued in July.

Country Courses.

Mooroopna.

The following lectures will be given on July 17 at Mooroopna: 2.15 p.m., Dr. K. M. Bowden, "Some Common Medico-Legal Problems in General Practice"; 4 p.m., Dr. R. S. Hooper, "Trilogy on Intracranial Hæmorrhage: (i) Birth Injuries of Children, (ii) Traumatic Intracranial

Hæmorrhage, (iii) Spontaneous Intracranial Hæmorrhage". The local secretary is Dr. B. R. Schloeffel, Maud Street, Shepparton.

Portland.

The following lectures will be given on July 17 at Portland: 4 p.m., Dr. Geoffrey Penington, "Virus Diseases and Their Treatment"; 8 p.m., Dr. V. E. Hollyock, "Some Aspects of Obstetrical Hæmorrhage". The local secretary is Dr. W. R. Angus, 214 Koroit Street, Warrnambool.

General.

The fee for country lectures is at the rate of 15s. per lecture, payable to the Post-Graduate Committee, but those who have paid an annual subscription to the committee are invited to attend without further charge.

The address of the Melbourne Permanent Post-Graduate Committee is 394 Albert Street, East Melbourne. Telephone: FB 2547.

Medical Prizes.

AMERICAN DERMATOLOGICAL ASSOCIATION PRIZE ESSAY.

THE American Dermatological Association offers a series of prizes for the best essays submitted for original work, not previously published, relative to some fundamental aspect of dermatology or syphilology. Cash prizes will be awarded as follows: five hundred dollars, three hundred dollars and two hundred dollars for first, second and third place, respectively. Manuscripts typed in English with double spacing and ample margins as for publication, together with illustrations, charts and tables, all of which must be in triplicate, are to be submitted not later than November 15, 1954. The manuscripts should be sent to Dr. J. Lamar Callaway, Secretary, American Dermatological Association, Duke Hospital, Durham, North Carolina.

The competition is open to scientists generally, and is not limited to physicians.

The candidate winning first prize may be invited to present his paper before the annual meeting of the American Dermatological Association with expenses paid in addition to the five hundred dollar prize. Further information regarding this essay contest may be obtained by writing to the Secretary of the American Dermatological Association. The next annual meeting of the American Dermatological Association will be held on April 17 to 21, 1955, at the Belleview Biltmore, Belleair, Florida.

University Intelligence.

THE UNIVERSITY OF ADELAIDE.

Additions to the Medical School.

THE plans for the Medical School of the University of Adelaide envisage a final building of seven floors, each some 15,000 to 16,000 square feet in area. By the end of 1950 four floors had been completed, the remaining three being of about one-third their final area, with provision for successive completion in the future. Thus only the front of the building reaches the final height, this expedient having been adopted to permit of immediate installation of full lift shafts *et cetera*.

The Medical School was designed primarily to house the basic medical sciences, one floor being allowed for each major department calculated for a comfortable intake of up to one hundred students *per annum*, which is the optimum recommended in the Goodenough report. The ground floor contains offices, students' and attendants' accommodation, X-ray department, workshop, mortuary and two large lecture theatres. Anatomy occupies the first floor, embryology-histology and the medical library share the second floor and physiology has the third floor. Pathology is spread over the upper three part-floors, sharing the top floor with the caretaker's residence and the animal house.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MAY 29, 1954.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.[2]	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.[3]
Acute Rheumatism	3(2)	3(1)	3	..	..	..	..	..	9
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	1	..	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	2(1)	..	..	..	..	..	..	..	2
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	7(7)	18(12)	6(3)	..	..	..	1	..	27
Diphtheria	21(18)	..	5(2)	..	..	..	..	4	30
Dysentery (Bacillary)	..	1	..	2(2)	..	2(2)	..	..	5
Encephalitis	..	..	..	..	..	..	..	..	..
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	32(17)	10(4)	..	..	..	..	..	..	42
Lead Poisoning	..	2(2)	..	..	..	..	2	..	2
Leprosy	..	..	..	..	..	..	..	..	2
Leptospirosis	..	..	4(1)	..	..	..	..	..	4
Malaria	..	1(1)	..	..	..	..	1	..	2
Meningococcal Infection	3(2)	2(2)	1(1)	..	..	..	..	..	6
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	7	12(9)	..	1	..	..	..	..	20
Puerperal Fever	..	..	2	..	..	..	..	..	2
Rubella	..	9(8)	1	..	..	..	..	..	10
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	14(8)	15(9)	6(3)	3(1)	..	..	..	..	38
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	1(1)	2	..	..	..	..	..	3
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	58(37)	37(32)	8(6)	5(4)	..	2(2)	2	..	112
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	1(1)	..	..	..	..	1
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from Western Australia

Recently, the University Council entered upon an arrangement with the Commonwealth Government to establish a nutrition research centre. This is to take over the whole of the top part-floor (except for the caretaker's flat), depriving pathology of some of its space. At the same time, expansion of the Department of Medicine is aggravating the congestion in the Institute of Medical and Veterinary Science. The State Government has helped towards solving the double difficulty by making a grant of £50,000 to complete the fourth floor of the Medical School. That will permit pathology to expand to occupy the whole floor. Then bacteriology can move out of the Institute of Medical and Veterinary Science into the vacated fifth floor, sharing practical classroom space with pathology. When the fifth floor can be completed it is hoped to provide bacteriology with the whole of the floor space. That will still leave considerable room for expansion by completion of the sixth floor.

It is of interest that this call for expansion comes within five years of the first occupation of the building by the Department of Anatomy. However, the necessity was foreseen and expansion can proceed smoothly along the lines originally planned. Unfortunately, the delay has been costly. When the building was begun in 1947 the cost for a whole floor was estimated at £20,000. Now it will cost £50,000 for only two-thirds of a floor. It will be of interest to see how costs compare when the time comes to complete the remaining two floors.

Australian Medical Board Proceedings.

TASMANIA.

THE following have been registered, pursuant to the provisions of the *Medical Act*, 1918, as duly qualified medical practitioners: Jones, Robert Hammond, M.B., B.S., 1952 (Univ. Melbourne); Crawshaw, Brian Keith, M.B., B.S., 1952 (Univ. Sydney).

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Jones, John William Howard, M.B., B.S., 1953 (Univ. Sydney), Royal North Shore Hospital, Saint Leonards.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Dunstone, David Darroch, M.B., B.S., 1954 (Univ. Adelaide), 2 Seaton Avenue, Hazelwood Park.

Craven, Dilys Mary, B.Sc., M.B., Ch.B., D.C.H., 1942, 96 Woodville Road, Woodville.

Watson, Kenneth Graham, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), 132 Strangways Terrace, North Adelaide.

Watson, Arthur John, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), 48 Barnard Street, North Adelaide.

Sweeney, Robert James, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), 273 North Terrace, Adelaide.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: McKenna, Keith Patrick, M.B., B.S., 1953 (Univ. Adelaide); Barker, Shirley Bowman, M.B., B.S., 1954 (Univ. Adelaide); Swiggs, Francis, M.B., B.S., 1954 (Univ. Adelaide).

Medical Appointments.

Dr. J. K. Kneebone and Dr. B. G. Thomas have been appointed honorary medical officers to the Port Lincoln Hospital, South Australia.

Dr. L. O. S. Poidevin, Dr. W. F. Joynt and Dr. A. D. Byrne have been appointed honorary obstetricians to the Queen Elizabeth Hospital, Adelaide.

Dr. G. W. E. Aitken, Dr. R. M. C. G. Beard and Dr. F. E. Welch have been appointed honorary assistant obstetricians to the Queen Elizabeth Hospital, Adelaide.

Dr. A. R. Magarey, Dr. Mary E. Walker, Dr. M. D. Dawson, Dr. J. L. Dunstone, Dr. D. M. Eldridge, Dr. B. M. Jolly, Dr. M. E. Nancarrow, Dr. J. L. Waddy and Dr. A. R. Weetman have been appointed honorary clinical assistants to the Queen Elizabeth Hospital, Adelaide.

Dr. H. G. Rischbieth has been appointed honorary pædiatrician to the Queen Elizabeth Hospital, Adelaide.

Dr. Dilys Mary Craven has been appointed honorary assistant pædiatrician to the Queen Elizabeth Hospital, Adelaide.

Dr. G. H. Jones has been appointed honorary radiologist to the Queen Elizabeth Hospital, Adelaide.

Dr. N. S. Solomons has been appointed to the School Medical Service in the Department of Public Health of New South Wales.

Dr. A. Worcester has been appointed a public vaccinator to the Shire of Warragul, Victoria.

Diary for the Month.

JUNE 22.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 23.—South Australian Branch, B.M.A.: Annual Meeting.
JUNE 23.—Victorian Branch, B.M.A.: Branch Council Meeting.
JUNE 24.—New South Wales Branch, B.M.A.: Branch Meeting.
JUNE 25.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Tasmania: Part-time specialist appointments for the north-west coast of Tasmania.

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